MAGAZINE

OF

ZOOLOGY AND BOTANY.

ORIGINAL COMMUNICATIONS.

I.—*Account of a Botanical Excursion in the Alps of the Canton of Valais, Switzerland, in August* 1835 ; *and Catalogue of the Plants collected, with occasional Remarks.* By R. J. Shuttleworth, Esq.

The following account of a botanical excursion to one of the most interesting parts of Switzerland, will be perhaps agreeable to some of your readers, and will give a fair idea of the variety and profusion of our Alpine vegetation.

Although the weather was on the whole very unfavourable, and prevented my exploring many points of peculiar interest to the botanist, the number of species I was enabled to collect was far from inconsiderable, and after my return home, many of them on examination proved to be particularly interesting, either from their rarity or novelty, or from the specimens being in a state which enabled me to rectify several errors contained in their descriptions, or to add remarks on characters hitherto passed over in silence. I have consequently added a list of all the species I collected, with such remarks as I imagine may prove useful ; and in order to render the Flora of the Gemmi more complete, I have incorporated the results of a short excursion made thither a fortnight later in the season this year. A few species from the neighbourhood of Zermatt are added, which were contained in a small parcel of plants purchased from a peasant, and which I was prevented from finding myself, either by the lateness of the season, or the unfavourable state of the weather. These are distinguished by an asterisk, and those of this year from the Gemmi by the date.

I might easily have increased the list by more than a hundred

species, had I enumerated such as I observed growing, but did not collect; but many of the Alpine species resemble each other so strongly, that I have rigidly abstained from admitting a single plant, which I did not bring home with me in such a state as admitted of careful examination and analysis.

I regret that I am unable to enter at all into the geographical distribution of the Swiss Alpine plants, but the flora of a small district, nowise bounded by natural limits, or distinguished by peculiar geological formation, can furnish data of but small importance individually; and I am firmly impressed with the conviction, that a thorough knowledge of all the species belonging to the flora of a country, as well as of the modifications which many species undergo according to locality and exposure, is indispensable, before generalising the results of detached observations. I am persuaded that the progress of this branch of the science is more impeded than advanced by the publication of indigested materials. An error once admitted into our printed records, often requires ages before it can be eradicated.

The remarks on the genera and species examined are by no means brought forward as infallible; they are, however, the result of a reiterated and careful examination: and I am fully aware that many of the reductions, as well as the claims of many of the species admitted, will not be approved. Some of the remarks also, on a celebrated German botanist, may perhaps be also blamed; but where a botanist establishes himself as a sort of dictator, and still errs, it is but just that his dictatorial expressions, only tending to mislead, should be quoted with full force against himself. In one or two genera, as Hieracium and Aconitum, a few species are adopted, which I also believe not to be based in nature; but until these genera are better understood, it is far preferable to distinguish marked forms as species, than leave them to be neglected as accidental varieties; and it must also be considered, that the true species of these genera, and of Hieracium in particular, often appear to pass by gradual transition into each other.

On the 15th of August 1835, I reached Kandersteg, at the foot of the Gemmi, (3280′ s. m. Keller's Map, 1833,) where the rain obliged me to remain until the afternoon of the following day, when I ascended the Gemmi by the usual path, and took up my quarters at the Inn of the Schwarrenbach, (5840′ Kell.) The 17th and 18th were employed in examining the rocks and heights behind the Inn, and those above the left bank of the Dauben See, (6860′ Kell.) Just below the Inn, I observed a few stunted plants of the fir;

but as they were not in a state to examine, I am not sure whether they belonged to the Alpine variety of Pinus sylvestris, the P. Mughos, of Swiss botanists, or to the P. uncinata of Ram. The Gemmi is composed chiefly of limestone rocks, but the presence of detached masses of granite proves that the higher points are of that formation. The view is one of the most dreary ; and the surface of the rocks between the Lake and the Daub (7049′ Michaelis in Fröbel and Heer Mittheilungen aus dem gebiete der Theoretischen Erdkunde, Vol. i. p. 231, et seq.) the highest part of the passage bears evident marks of having once been the bed of the glacier, which now is at some distance on the left.

I was joined in the evening by two young friends, who accompanied me during the remainder of my excursion, and we descended to the baths of Louesche, (Leuk. 4402′ Mich.) where it was dark before we arrived. On the 19th we botanized, passing through Inden (3580′ Kell.) and Varen, (2370′ Kell.) among the vineyards and waste fields along the horse road to Sierre, (Siders. 1712′ Mich.) situated on the Rhone. Having sent home by the post the plants collected, we ascended, on the 20th, the Valais, passing through the town of Louésch, (2100′ Kell.) where Onopordum Acanthium was growing in immense quantities, to Visp (2010′ Mich.) a small town built at the entrance of the valley of the same name, which at Stalden (2537′ Mich.), where we passed the night at the house of the Castellan or chief magistrate of the small town, branches into the Valley of Saas, and that of St Nicholas.

At Stalden we observed the last vineyards, and at a short distance higher up the last walnut trees, which were replaced by cherry trees.

On the 21st, we proceeded up the Valley of St Nicholas, through the hamlet of the same name, (3390′ Kell.) Randaa (4475′ Mich.), in 1819, half-destroyed by an avalanche, and Taesch, (4479′ Mich.) beyond which place the valley suddenly narrows, and again expands into that of Zermatt, at which village (5040′ Mich.) we arrived in the evening.

At Zermatt we were hospitably received by the parish priest, who is here, as in most of the retired parts of the Valais, the only person with sufficient accommodation to receive travellers. On the 22d, we started early in the morning, with the intention of extending our excursion to the edge of the glacier of the Col de Cervin, visible from the curé's house. We followed the course of the Vispbach for some time, and passed along the foot of the Rosa or Zermatt glacier, where I was surprised at finding patches of rye in almost immediate contact with the ice ; but we had hardly reached the

Schwarzseeberg, where the foot of the Zermatt glacier (6589′ Mich.) offered a rich harvest, when rain and fog came on, and drove us back about twelve o'clock. The glacier of Zermatt appears to have considerably advanced, as the remains of wooden sheds, almost covered by the Moraine, or wall of mud and stones ploughed up by the ice, attested. The formation of this part of the Valley of Zermatt, and of those parts we subsequently explored, is gneiss or granitic, which I mention, as it will serve to account for the difference between the vegetation observed here, and that of the Gemmi.

On the following morning, the rain still continued, but about twelve o'clock the day became more promising, and eventually cleared up, and we made an excursion to the glacier of Fünelen (or Finel,) on the northern not southern side of the valley, as it is erroneously marked in Keller's Map. (Base of the glacier, 6655′ Mich.) The rarest plants rewarded us, such as Artemisia mutellina, Pedicularis rostrata, Senecio uniflorus, and incanus in various forms, &c. and the beautiful Peltigera crocea, Wahl. Fries. I was particularly pleased at finding the Phleum commutatum, Gaudin, and the Phleum alpinum, L. and Auct. Helv. growing together, though not promiscuously; the former in large quantities, on muddy pasture ground, at the immediate edge of the glacier. On our return we passed through a very thin and aged wood of Pinus Cembra, L. the nut of which has an agreeable flavour, and is much relished: the wood is by far the most durable of European firs; but the species is rare, and occurs but in small quantities, and will, I fear, soon be nearly extinct in most parts of Switzerland, from the careless way in which the peasants employ it.

The weather appearing perfectly cleared up, we engaged two guides to conduct us over the Glacier of Taesch into the Valley of Saas, where, besides other rare plants, the Gentiana carinthiaca is indicated. Most part of the night was passed in putting in paper the plants collected, and in arranging the luggage, which had considerably augmented in bulk, in a more portable form. The moon was up, and the heavens perfectly clear, affording the most magnificent view of the chain of the Rosa, the Col de Cervin, and the Matterhorn, (M. Cervin, il Monte Sylvio,) by far the most grand and awful scene I had ever witnessed. The Matterhorn rises a perfect pyramid of rock to the height of 13,854′, (Gaudin) with sides so precipitous as to be entirely free from snow.

It was later on the following morning (the 24th) than we intended, when the guides made their appearance, and we were ready to start: They assured us that they knew the passage perfectly well,

that it was easy, and that the glacier would not require more than three hours to cross. It was six o'clock before we were off, when, retracing our steps for a short distance, we crossed the river, and gradually ascending the foot of the mountains through magnificent larch forests, we soon entered the small lateral valley of Taesch, at some distance above the hamlet of the same name. A few specimens of Artemisia nana, Gaud. nearly allied to, but certainly distinct from, the Art. campestris, were found ; and having partook of the hospitality of the inhabitants of a few chalets at the entrance of the valley, called Alpen, who have the charge of the cattle belonging to the commune of Taesch, we followed the course of the small torrent nearly to the foot of the glacier ; here we commenced a steep ascent between the north side of the glacier, and a wall of perpendicular rocks, occasionally enlivened by small waterfalls. On these rocks, I gathered the rare Aretia tomentosa, Schleich., and the Poa Gaudini, Kunth. (the P. aspera, Gaud. but certainly identical with the Scotch P. cæsia.) The vegetation was so luxuriant, and the plants so rare, that I spent much more time than was advisable in filling my box ; but such plants as Trifolium saxatile, Campanula cenisia, Gentiana glacialis, Juncus Jacquini, β, (apparently hitherto never collected with ripe capsules,) Senecio uniflorus, All., Phaca lapponica, Wahl., and Oxytropis cyanea, M. B., were too powerful attractions to be resisted, and it was two o'clock before we reached the termination of the rocks, and that part of the glacier where we had to commence the passage.

Phænogamous vegetation had entirely ceased, but among the last flowering plants I observed growing on the Moraine, the Myosotis nana and Aretia pennina—the brilliancy of the bright blue of the one, and the softness and elegance of the pale rose, violet or white flowers of the other, no words can express. The last flowering plant was a small state of Luzula spicata, forming large dense tufts, and which, intermixed with lichens, formed the whole of the vegetation for some extent. Some Chamois were seen by the guides, but they had disappeared before I could distinguish them from the grey rocks on which they were standing.

From the edge of the glacier to the summit of the pass, the ascent was easy, and, excepting one or two chasms which occasioned a short delay, perfectly free from danger ; but it was not without some anxiety and misgivings, that my attention was drawn, by the mutterings of the guides, to a mass of black clouds, which had formed on the summit of the Matterhorn.

We reached the summit of the pass, (10,947′ at 6 metres below

the highest part of the ridge—probably the highest pass in Europe, as the Col de Cervin is, according to Saussure 10,284′, or according to Welden 9948′; and the Col de Géant, 10,598′, Michaelis. l. c.)—about 3 o'clock, and after a halt of a few minutes, we commenced a most rapid descent over a smooth field of snow, (at an angle of 15 degrees, Mich.) It soon became, however, more gradual, and eventually the descent was almost imperceptible; but chasm after chasm soon broke up the hitherto smooth surface of indurated snow, into the most rugged and dangerous glacier. The clouds had gradually spread, and we were soon enveloped in a thick and wet mist. All our endeavours to keep clear of the wider chasms were ineffectual, and having, with great difficulty and much expenditure of time, passed several, covered only with a thin layer of snow, which offered no resistance to the passage of our poles, we were obliged to give up the direction we had taken towards the right side of the glacier, and to attempt reaching the rocks on the left. Here we found more difficulty in proceeding, as the ice did not reach the rocks, but was separated from them by large apertures and deep wide clefts, of which the walls were more than 100 feet high. Again we attempted the centre of the glacier, but were not a little disconcerted at finding the chasms increase rapidly both in size and number. The fog was now so dense that we could not see ten yards before us, and at last the guides gave up all hope of getting off the glacier that night, as the rocks and higher points by which they were enabled to guide their course, were invisible. The impossibility of either advancing or returning was too evident, and nothing remained but to submit; and excepting a small piece of bread in our pockets, unprovided with food and clothed in linen dresses, it was not without considerable doubts whether we should succeed better on the following day.

On taxing the guides with their ignorance, one of them then said for the first time, that he had not crossed the glacier since the preceding year, and that the whole nature of the ice and the direction of the chasms were completely changed. However true this may have been, it is the usual excuse that guides bring forward on such occasions.

After considerable exertion, and several narrow escapes from being engulfed, we succeeded in reaching a high bank of smooth snow on the north side of the glacier, where night surprised us, still hunting out for the shelter of a rock. We were therefore obliged to take up our quarters under a mass of broken rock, which afforded a sort of shelter to our heads and backs, but not before we were so

wet through, that the tinder in our pockets was become perfectly useless, and after several vain attempts we were obliged to give up all hope of lighting a cigar. Although much fatigued, there was of course no prospect of sleep, and the night was passed half sitting, half standing, in keeping each other awake, and in stamping with our feet to prevent their becoming quite benumbed. The fog turned into snow during the night, and the cold was less intense than it would otherwise have been. The novelty of the position, the intense silence around us interrupted only by the rumbling of a dull low thunder, and occasional reports of masses of snow or rock precipitated from the heights upon the ice beneath, together with occasional distant glimpses of the rocks, and the bed of the glacier below us, lit up by flashes of lightning, afforded ample and not entirely disagreeable food for reflection.

Our guides had recourse to sleep, to muttering prayers, to occasional grumblings to pass the time, and one of them, who appeared never to have been in such a situation before, wished himself repeatedly back with his four-footed grunting companions in his snug chalet in the vale. At last they appeared rather more tranquillized, and finished by vowing a mass to their patron saint for all our souls, provided we got safe off the ice.

As soon as we could see on the following morning, we sent our guides out to report as to our prospects, and as to what was to be done : but, having already undergone so much, I insisted upon still attempting to descend into the valley of Saas.

Full two feet of snow had fallen during the night, and by its weight and softness had rendered the old snow quite unsafe, and the fog, which had partially cleared off during the early part of the morning, again thickened around us ; so that after several hours spent in gaining the opposite or south side of the Glacier, we were obliged to decide on retracing our steps, and returning to the valley of St Nicholas by the same route we had taken the day before. A sufficiently extensive view from the highest part of the southern side of the glacier, showed us an immense extent of glacier, which we should have had to pass over, covered with snow, but proving, by its undulated surface, that it was equally split up with chasms as that which we had already traversed.

We retraced then our steps to the point where we had left the course of the preceding day, and without deviating from our trail, which the fresh snow had not entirely effaced, we commenced our toilsome return. The chasms, which had been easily distinguished the day before, were now almost imperceptible to the unaccustomed eye, and before each step, the nature of the snow had to be examined with our poles.

Every now and then a shout gave notice that the snow had given way beneath one of the party, and one of my companions had a very narrow escape, being solely saved by falling with his pole across the chasm, which enabled him to support himself until we could come to his assistance. Yet such is the indifference to danger in such situations, that his first exclamation on our handling him rather unceremoniously was, "Take care what you are about, you'll tear my trowsers." After great exertion in bearing up against a cutting wind, mixed with frozen particles of snow, which blew directly in our faces, we reached the summit of the pass, and soon, with less difficulty than we expected, arrived at the termination of the glacier. It was, however, past two o'clock before we were off the ice. But what a change had taken place in the face of nature! for near 3000′ below the spot where on the preceding day we had been struck by the luxuriance of the vegetation, the ground was covered with several inches of snow. We hurried on as quick as possible, and arrived at the village of Randaa about seven o'clock in the evening, where we were hospitably received by the curé.

A few minutes in the warm room produced a lively sense of pain and burning in the skin of the face and the eyes, and on the following morning (the 26th) I was completely blind. By degrees I could open my eyelids for a minute at a time, but we did not entirely recover from the effects of the reflection from the snow, and of the cutting wind, before a fortnight had elapsed.

Having engaged a man to carry our luggage, we slowly redescended the valley of St Nicholas, and passing through Visp, slept at Brieg, where, with much suffering from my eyes, I put in paper the contents of my box, which I was delighted to find as fresh as when they were gathered. The mosses, however, of which I had collected a considerable quantity, having been tied up in a parcel, were entirely spoilt.

On the 27th we walked as far as Münster, at the head of the Valais, and on the 28th, hurried over the Grimsel, which we found covered with nearly a foot of snow, to Meyringen, whence we took a char to Brienz, and returned on the 29th through Interlaken and Thun to Berne.

Catalogue of the Plants collected, with occasional remarks.

1. *Chara* aspera, Willd.
   H. In fossis prope Pfyn, inter Siders et Leuk.
2. *C.* hispida, L. β gracilis, Hook.
   H. Cum præcedenti.

3. *Polypodium* Phegopteris, L.
   H. In ascensu M. Gemmi supra Kandersteg, 29 Aug. 1836.
4. *Cistopteris* dentata, Hook. Br. Fl. i. p. 451, *α*.
   H. In saxosis umbrosis inter Randaa et St Nicholas, et forma tenuior plerumque sterilis, in umbrosis M. Gemmi supra Kandersteg, 29 Aug. 1836.

Obs. Frons pedalis et ultra, sed omnino convenit cum char. Smithii et Hookeri, et cum spec. Valesiacis a Thomasio lectis. Stipes glabra ; sori generis forsan maximi, in partem frondis superiorem confluentes. Pinnæ vix alternæ, remotæ ; pinnulæ ovatæ obtuse dentatæ alternæ, (infimæ interdum subpinnatifidæ.) Species Germanis vix cognita, vel cum Asp. Filix Fœmina confusa, et apud Wallroth in Bluff et Fing. Comp. Fl. Germ. iii. p. 20.

5. *C.* fragilis, Bernth.
   H. In umbrosis M. Gemmi supra Kandersteg, et in fissuris rupium ad lacum Dauben, 29–31 Aug. 1836.
6. *C.* alpina, Desv.
   H. In saxosis M. Gemmi supra Schwarrenbach.
7. *C.* montana (—?) Polypodium, All. Hoffm. Cyathæa, Roth.
   H. In umbrosis M. Gemmi supra Kandersteg, 29 Aug. 1836.

Obs. Habitus P. calcarei, Sm. sed frons tenuissima, triplicato-pinnata.

8. *Cryptogramma* crispa, R. Br.
   H. In saxosis M. Grimsulæ infra Hospitium.
9. *Botrychium* Lunaria, Sw.
   H. In pascuis M. Gemmi supra lacum Dauben. In M. Fünelen supra Zermatt, et in Alpibus supra Tæsch.

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10. *Lycopodium* Selago, L.
    H. Prope Kandersteg.
11. *L.* selaginoides, L.
    H. In M. Gemmi supra Kandersteg.
12. *L.* helveticum, L.
    H. Ad terram inter muscos inter St Nicholas et Zermatt.

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13. *Elyna* spicata, Schrad.
    H. Copiose in graminosis M. Gemmi supra Schwarrenbach, et ad lacum Dauben. In M. Schwarzseeberg supra Zermatt.

Obs. Culmi biunciales atque fere pedales.

14. *Kobresia* caricina, Willd.
    H. Copiose in humidis M. Gemmi ad pedem rupium supra Schwarrenbach usque ad summum M. Schalmette, et ad lacum Dauben.

Obs. Culmi bi-octunciales, in Helvetia rarissima.

15. *Carex* (*Vignea*) fœtida, All.

H. In M. Gemmi supra Schwarrenbach, ad moles glaciales, M. Fünelen.

16. *C.* (*V.*) incurva, Huds. C. juncifolia, All. Gaud.

H. Rarissime ad moles glaciales M. Schwarzseeberg et Fünelen.

Obs. Non diversa a planta Scotica, nisi culmis vix incurvis.

17. *C.* (*V.*) lagopina, Wahl.! C. approximata, Hoppe exs! Gaud.

H. Ad moles glaciales M. Schwarzseeberg et Fünelen.

Obs. Paleæ fructu breviores foliaque marginibus scabra ut observat Hoppe, contra Gaudin.

18. *C.* (*V.*) leporina, L. C. ovalis, Good.

H. In uliginosis M. Grimsulæ supra Obergestelen.

19. *C.* curvula, All. α. minor, foliis culmisque vix 4-uncialibus, unilateraliter curvatis. β. major, culmis erectis, fere pedalibus, Gaud.

H. α. Ad moles glaciales M. Fünelen. β. ad fissuras rupium M. Gemmi supra Schwarrenbach, et ad lacum Dauben.

20. *C.* nigra, All. C. atrata γ. nigra, Gaud.

H. In M. Gemmi prope die Wintereck; ad lacum infra Schwarrenbach, et ad nives deliquescentes supra Schwarrenbach, copiose.

Obs. Cæspites densas efficit. C. ustulata, Wahl.! (C. atrofusca, Schk.) qua cum, Smithio præunte, nostram plantam infauste conjunxit cl. Lindley, Syn. ed. ii. p 288, omnino diversa est. C. nigra, All. "spicis subquaternis ovatis confertis sessilibus rigide erectis, fructuque glabro," Gaudet.

21. *C.* atrata, L. α. varia; spicis longius pedunculatis demum pendulis fructibusque flavis, culmo plerumque elatiori (glabro,) Gaud.

H. In M. Gemmi supra Kandersteg, et in graminosis supra Schwarrenbach.

Obs. Planta Scotica ex Alp. Clova plerumq. ad varietatem sequentem pertinere videtur. β. dubia, spica terminali mascula (flosculis paucioribus fœmineis intermixtis,) reliquis mere fœmineis, fructibus atro-purpureis unicoloribus, culmo elatiori, (sub spiculis scabro,) Gaud. C. aterrima, Hoppe.

22. *C.* ornithopoda, Willd.

H. In fissuris rupium M. Gemmi, ad moles glaciales Lammerngletscher.

23. *C.* glauca, Scop. C. recurva, Huds., var. Alpina, spiculis fœmineis apice basique masculis.

H. Ad rivulos et in uliginosis M. Gemmi supra Schwarrenbach.

24. *C.* capillaris, L. *α.* minor, culmo 4–6 unciali. *β.* major, culmo pedali et ultra.

H. *α.* In M. Gemmi ad lacum infra Schwarrenbach, et ad rupes supra Schwarrenbach, et ad lacum Dauben. *β.* in M. Schwarzseeberg.

25. *C.* brachystachys, Schk.

H. In graminosis M. Gemmi supra Kandersteg, 29 Aug. 1836.

26. *C.* firma, Host.

H. Ad rupes M. Gemmi supra Schwarrenbach.

27. *C.* Mielichhoferi, Schk.

H. In uliginosis M. Gemmi supra Schwarrenbach.

Obs. Spicæ fœmineæ pendulæ non erectæ ut apud Lindley, Syn. p. 287. An Planta Scotica ad C. ferrugineam, Schk. (sempervirentem, Vill.) referenda?

28. *Blysmus* compressus, Panz. *β.* glacialis mihi. Spica tenui gracili fusca.

H. In uliginosis ad moles glaciales valleculæ Tæsch.

29. *Cladium* Mariscus, R. Br.

H. In paludosis prope Pfyn, inter Siders et Leuk.

30. *Eriophorum* capitatum, Host.

H. In uliginosis ad moles glaciales M. Fünelen.

31. *Brachypodium* sylvaticum, R. and S. *α.* spiculis villosis, Gaud. *β.* gracile, Rchb.

H. Inter St Nicholas et Zermatt.

32. *Agropyrum* glaucum, R. and S. *α.* Spiculis omnino muticis, Koch. Triticum intermedium *α.* Gaud.

H. In arvis incultis inter Inden et Varen.

83. *Cynodon* Dactylon, Rich.

H. In arenosis inter Siders et Leuk, et inter Stalden et Visp.

34. *Agrostis* alpina, Scop. Kunth. A. rupestris, Willd. Gaud.

H. Ad rupes M. Gemmi supra Schwarrenbach, 30 Aug. 1836.

35. *A.* alba, Schrad. *β.* pauciflora, Koch. A. alba patula, Gaud. Rchb. Agr. Germ. Tab. 25, f. 1432.

H. Ad viam inter Stalden et St Nicholas, et in glareosis M. Gemmi supra Schwarrenbach, 29 Aug. 1836.

36. *Calamagrostis* tenella, Lk. Agrostis pilosa, Schleich. Gaud.

H. In consortio Junci Jacquini. *β.* in Alpibus supra Tæsch.

37. *C.* acutiflora, DC. Rchb. Agr. Germ. Tab. 39. f. 1442.

H. In glareosis M. Gemmi supra Schwarrenbach, cons. Poæ distichophyllæ, Gaud. et P. flexuosæ, Wahl. 30 Aug. 1836.

Obs. Forsan forma alpestris C. Montanæ, Host. (Deyeuxia varia, Kunth.) ut opinantur cl. Koch et Duby ; sed facile distinguenda, panicula rigida et pilis palea acuminata brevioribus. cf. Agrostis montana γ. Gaud. Helv. i. p. 201, quæ differt pilis longioribus, foliisque ad vaginæ commissuram barbatis.

38. *C.* Halleriana, DC. C. Pseudo-phragmites, Lk. Rchb. Arundo Halleriana, Gaud.

H. In uliginosis prope Randaa.

Obs. Habitus C. montanæ, Host. varietatis gracilis, sed differt pilis omnibus liberis, (sine penicello piloso, vel rudimento alterius flosculi) atque arista paleis breviori, nisi oculo armato, ægre distinguenda.

39. *Stipa* capillata, L.

H. Ad viam inter Varen et Siders, et inter Siders et Leuk, copiose.

40. *S.* pennata, L.

H. Copiose in sylva supra Zermatt, prope moles glaciales.

41. *Lasiagrostis* Calamagrostis, Lk. Agrostis, L. Stipa, Wahl.

H. In glareosis prope Kandersteg, et in apricis inter Inden et Varen.

42. *Setaria* verticillata, P. B.

H. In arvis et vineis prope Stalden.

43. *S.* viridis, P. B. α. minor, Gaud. Rchb. Agr. Germ. Tab. 47. f. 1467. *b.* β. major, setis longissimis, Gaud. Rchb. l. c. f. 1467.

H. α. In arvis incultis prope Varen. β. prope Varen.

44. *Phleum* Boehmeri, Schrad. β. paleis nudiusculis (ad carinam) scabris, Gaud.

H. In alpibus supra Tæsch, et prope Randaa.

Obs. In spec. prope Randaa lectis, paleæ etiam sub lente vix scabræ ; in spec. supra Tæsch lectis, paleæ evidenter scabræ, sed non ciliatæ.

45. P. Michelii, All.

H. Rarius in M. Gemmi supra Schwarrenbach.

46. *P.* alpinum, L. Gaud. Helv. i. p. 165. Dub. Bot. Gall. i. p. 508. Rchb. Agr. Germ. Tab. 50. f. 1485. Non Auct. Brit.

Phleum radice repenti vix cæspitosa, foliis supremis vagina vix inflata dimidio brevioribus ; Ligula suprema oblonga acuta, glumis glabris truncatis palea sublongioribus, setisque ciliatis.

H. In graminosis humidis M. Gemmi supra Schwarrenbach ; in uliginosis ad moles glaciales M. Fünelen ; in ascensu M. Grimsulæ supra Obergestelen, (copiose etiam in pascuis et pratis M.

Stockhorn, Bürglen, et Faulhorn, atque in pascuis summis Jurassi rarius, legi.)

Obs. In locis petrosis, vel in graminosis sterilioribus, spica ovato-cylindrica brevior magisque colorata est, foliaque paulo breviora : hæc videtur var. β. tenue, Kunth. Agr. i. p. 29. In locis crassioribus et præsertim in pascuis et graminosis pinguioribus circa casas Alpicolorum, tota planta laxior crassiorque evadit, foliaque latiora, sæpe longissima, et spica cylindrica biuncialis minus colorata, foliis supremis brevior, vaginæque semi-inclusa. Hæc forma habitum Phl. Michelii satis refert : in utraque varietati, notæ e setis vaginisque sumptæ constantes videntur, et species omnino a P. commutato, Gaud. diversa. Ligula in forma crassiore sæpe fissa occurrit.

47. *P.* commutatum, Gaud ! Helv. i. p. 166. Dub. Bot. Gall. i. 508. P. alpinum, Auct. Brit. ! vix L.

Phleum radice repenti, valde cæspitosa, foliis supremis vagina inflata, quatuor parte brevioribus ; Ligula suprema brevissima obtusa, glumis glabris truncatis palea sublongioribus ciliatis, seta nuda, scabra.

H. Copiose in uliginosis ad moles glaciales M. Fünelen, cons. præcedentis.

Obs. Spica latior robustior quam in præcedenti, ovato-oblonga ; spiculæ fere duplo majores, foliaque glaucescentia ; seta scabra nec ciliata ; varietatem minorem P. alpini pro nostra planta sæpius accepi, et opinor planta vera Kochio et Kunthio omnino ignota est, quippe nulla ratione ad formam tenuem P. alpini redigenda nostra robustior rigidiorque planta. Icon in Eng. Bot. ed. 2da, Pl. 80, habitum P. commutati satis bene refert, sed nec hac neque ad præcedentem referenda quoniam glumæ omnino glabræ depictæ sunt. Quoad habitum potissimum ad Phleum Gerardi, All. et auct. plantam rarissimam, accedit, cujus diagnosim differentialem comparationis gratia hinc adjeci.

Phleum Gerardi, All. ! Kunth. Alopecurus, Vill. Colobachne, Link. Rchb. Agr. Germ. tab. 50. f. 1480.

P. radice bulbosa ; vagina suprema valde inflata, in folio brevi latoque attenuata, ad collum vix unquam constricta ; ligula brevissima, glumis villosis palea subbrevioribus, molliter ciliatis, in setam brevem scabramque attenuatis.

Obs. Spica lata brevis, ovata, setæque flavescentes. Mihi videtur omnino ad genus Phleum pertinere.

Ad hanc speciem ducit cl. Rchb. in Agrost. Germ. p. 18, P. commutatum, Gaud. et P. capitatum, Scop. In Fl. Germ. exc. No. 191, speciem distinctam constituit sub nomine " Ph. capitatum,

Scop." sed P. capitatum, Scop. Carn. i. p. 56, e descriptione cl. auctoris, " spica subrotunda," " calycinæ glumæ acuminatæ," omnino ad P. Gerardi, All. pertinet.

P. Gerardi, All. habui ex Herbario Allionii ! a cl. Balbis ; ex Alp. Delphin ; a cl. Emeric ; et ex Alp. Julio-Provinciæ a cel. De Candolle ; (in Herb Roemer ;) sed etiam sub hoc nomine P. commutatum, Gaud. Roemero misit Balbis.

Denique observandum est, utram specierum descripsit illust. Linnæus vix extricandum—forsan ambas ?—sed minimi momenti si distinguuntur.

48. *Festuca* alpina, Sut. Gaud.

H. Ad rupes M. Gemmi supra Schwarrenbach rarius.

49. *F.* Halleri, All. Vill. Gaud. Kunth. Agrost. i. p. 399, et ii. p. 322.

Festuca racemo spiciformi congesto subsimplici, inferne rarius ramoso, ramulo biflori ; spiculis 4–5 floris ; aristis paleam pubescentem nervosam æquantibus ; rachi pilosa, demum sæpius glabra ; foliis capillari-setaceis.

H. In glareosis M. Fünelen, et in alpibus supra Tæsch.

Obs. Plantæ Allionii et Gaudini certe omnino eædem. Citata sola Allionii in Fl. Ped. ii. p. 253, No. 2245, est descriptio Halleri in Hist. ii. p. 215, No. 1441. Germen maturam lineari-oblongum, immaturum lineari-obovatum, et stigmata barbata germine maturo breviora vel subæqualia observavi.

Ab hac differre videtur planta, quam in M. Faulhorn legi, et pro F. Gaudini, Kunth. l. c. Syn. excl. habeo.

Festuca racemo spiciformi, subpatenti, superne simplici, inferne subcomposito, ramulis 2-4 floris ; spiculis sub 4-floris, aristis palea glabra dimidio brevioribus ; rachi aspera, foliis capillari-setaceis.—Germen obovatum vel subgloboso-pyriforme : stigmata dense barbata germine multo longiora, conspicua ; sed denuo examinanda, annon mere F. Halleri varietas.

50. *F.* violacea, Gaud. *α.* vulgaris :— *β.* elatior, pedalis sesquipedalis, panicula coarctata.

H. *α.* In M. Gemmi supra Schwarrenbach. In M. Schwarzseeberg, et ad moles glaciales summi jugi alpium supra Tæsch. *β* ad rupes. M. Gemmi ad moles glaciales Lammerngletscher. 31 Aug. 1836.

Obs. Nullomodo lusus naturæ, F. Halleri All. ut quærit cl. Kunth. l. c sed F. nigrescenti, Lam. valde affinis, quâ distinguitur spiculis duplo minoribus, &c.

51. *F.* pumila, Vill.

H. Ad moles glaciales summi jugi alpium supra Tæsch ; cæspites densissimos efficiens, in graminosis M. Gemmi supra Kandersteg, et ad rupes supra Schwarrenbach. 29–30 Aug. 1836.

Obs. Spec. ad moles glaciales lecta minora sunt ac minus colorata quam ea e M. Gemmi.

52. *F.* varia, Haenke. Gaud. F. acuminata, Gaud ! α. panicula contractiori, spiculis variegatis. Gaud.

H. In M. Schwarzseeberg supra Zermatt.

Obs. F. xanthina R. & S. ! F. Hostii Schott ! (etiam a Schottio missa ut F. flavescens, Host.) est omnino eadem ut. F. flavescens, Bellardi ! ; et vix ac ne vix diversa a F. variæ var. β flavescenti, Gaud.

53. *F.* rubra, L. Koch. Rchb. Gaud. var. panicula rigida coarctata.

H. Ad viam prope Zermatt.

Obs. F. rubra radice repenti egregie differt a F. duriuscula radice fibrosa—Specimina fere omnia qua e Britannia accepi et legi pro F. duriuscula ad formas F. rubræ pertinent.

54. *F.* nigrescens, Lam. Gaud !

H. In M. Schwarzseeberg supra Zmutt :—ad rupes M. Gemmi supra Schwarrenbach et lacum Dauben. 30, 31 Aug. 1836.

Obs. Occurrit folio caulino summo angustissime-lineari in sicco revoluto, et ad unam lineam lato plano.

55. *F.* Scheuchzeri, Gaud. F. pulchella, Schrad. Poa—Clairv.

H In glareosis M. Gemmi supra Schwarrenbach. 30 Aug. 1836.

56. *Melica* ciliata, L.

H. Ad rupes prope pagum Stalden.

57. *Bromus* squarrossus, L. α. spiculis glabris.

H. Ad viam inter St. Nicholas et Zermatt.

58. *Poa* Eragrostis, L.

H. Ad viam inter St Nicholas et Stalden.

59. *P.* laxa, Haenke.

H. Ad rupes alpium supra Tæsch : in saxosis M. Gemmi ad moles glaciales Lammerngletscher et supra lacam Dauben, copiose. 31 Aug. 1836.

Obs. Planta valde variabilis. Culmi 4 unciales—semipedales et ultra : variat panicula rigidiori vix pendula, spiculis vix constrictis, atque panicula filiformi pendula, spiculis omnino constrictis : radix vix repens sæpius mere fibrosa. Forsan et Poam minorem, Gaud. legi, sed fateor, species mihi vix diversa videtur. cf. Rchb. Agr. germ. Tab. 72, f. 1623, et Tab. 74, f. 1630–31.

60. *P.* alpina, L. β vivipara, Gaud. Koch. γ. frigida Gaud. Koch. δ. brevifolia, Koch. P. alpina, II brevifolia, Gaud.

H. β. in alpibus supra Zermatt, γ. in saxosis M. Gemmi, ad moles glaciales Lammerngletscher, 31 Aug. 1836. δ. ad moles glaciales summi jugi alpium supra Tæsch.

61. *P.* distichophylla, Gaud!

H. In glareosis M. Gemmi supra Schwarrenbach, et supra lacum Dauben ad nives perennes. 30, 31 Aug. 1836.

Obs. P. cenisia, All. cujus exemplaria nonnulla a cl. Balbis, diu possessori Herbarii Allionii, missa, habeo, certe diversissima, nec cum varietatibus P. alpinæ ulla ratione conjungenda. Spec. mea, nisi locustis paucifloris, certissime non 7-floris, bene cum descriptione cl. auctoris in Auct. ad Fl. Ped. p. 40, No. 2209, conveniunt. Differt a P. distichophylla, Gaud. panicula gracili, pedunculis verticillatis, spiculis multo minoribus, et ligulis truncatis subnullis ;— a P. alpina toto habitu et radice eximie repenti, stolonifera. Me judici ad Poam nemoralem, L. referenda, et forsan ad varietatem glaucam, R. et S. ! (P. glaucantha, auct. P. nemoralis cæsia, Gaud.) Ex alpibus Tyrolensibus a cl. Siebero plantam possedeo etiam sub nomine P. cenisiæ missam, quæ autem differt radice fibrosa, spiculisque multo majoribus confertis, et omnino cum icone Rchb. Agr. Germ. Tab. 83. f. 1625, et cum spec. P. badensis Hænke, P. alpinæ badensis, Gaud ! convenit.

62. P. flexuosa, Wahl. Carp. excl. Syn. Gaud. Rchb. l. c. Tab. 74. f. 1633.

H. In glareosis M. Gemmi copiose cum præcedenti. 1836.

Obs. Differt a præcedenti panicula effusa, gracili, pedunculisque inferne longe nudis : planta omnino gracilior.

63. *P.* Gaudini R. et S. Kunth Agr. I. 355. P. aspera, Gaud. P. cæsia, Sm. α. panicula coarctata, Kunth. l. c. β panicula diffusa, Kunth l. c.

H. Ad rupes alpinas supra Tæsch.

Obs. α. Omnino convenit cum Spec. Plantæ Scoticæ e Ben Lawers, sed in H. B. E. cultis et a cl. Graham communicatis : certe a Poa nemorali distincta—β. variat ligula brevissima ac exserta in eodem individuo.

64. *P.* nemoralis, L. ζ. coarctata, Gaud.

H. Ad viam prope Zermatt.

65. *Koeleria* cristata, Pers. α gracilis. Rchb. Agr. germ. Tab. 93. f. 1668. γ. lobata. Rchb. l. c. f. 1670.

H. α. In Schwarzseeberg, M. Fünelen, et ad rupes alpinas supra Tæsch; γ. in M. Fünelen.

Obs. α. Variat foliis glabriusculis. β. In planta campestre, etiam valde variabili, panicula minus colorata, magisque ramosa, glumæ paleæque facile duplo majores occurrunt.—Ab hac specie, quacum sæpe confusa, omnino differt K. valesiaca, Gaud. (K. tuberosa, Pers. e spec. Hispanicis a Dufour missis, panicula glabra et etiam valde pubescenti, videtur omnino eadem. Nomen aptissimum forsan restituendum.)

Differt nempe panicula spiciformi valde congesta, ovato-cylindrica, foliis glabris glaucisque sed non semper convolutis, et præsertim culmo foliisque ad collum radicis tunicis filamentosis valde elongatis tectis; fere ut in Phleo Bertolonii, sed magis filamentosis. Speciem elegantissimam semipedalem, bipedalem et ultra, ad rupes aridas calcareas Jurassi comitatu Neocomensi copiose legi.

66. *Avena* (Trisetum) subspicatum, Clairv. Aira—L. Koeleria—Rchb.

H. In graminosis M. Gemmi supra Schwarrenbach: in alp. supra Zermatt, Zmutt et Tæsch.

67. A. (T.) distichophylla, Vill. α. genuina, panicula contracta, pilis corollas subæquantibus. β. gracilis, mihi, panicula effusa, magis composita, pilis corollis multo brevioribus. A. argentea, Willd.? Koch?

H. α. In M. Gemmi supra Schwarrenbach: in glareosis M. Schwarzseeberg et in M. Fünelen. β. in glareosis M. Gemmi cum var. α. 30 Aug. 1836.

Obs. Var. β, quæ vix ab exemplaribus germanicis A. argenteæ differt, a var. genuina recedit tenuitate omnium partium, culmo albiori graciliorique, foliis angustioribus multo longioribus, panicula magis composita, ramis nempe sæpius 5–6 floris, laxius effusa, et pilis glumis fere dimidio brevioribus: sed in utraque varietate, nihil magis variabilis quam foliorum, palearumq. longitudo. Folia nempe 8‴ ad 16‴ et etiam 2″ longa, et paleæ glumis breviores vel longiores.

68. *A.* Scheuchzeri, All. (1785) A. versicolor, Vill. (1787.)

H. In graminosis M. Gemmi supra Schwarrenbach: in Alp. supra Tæsch.

69. *Anthoxanthum* odoratum, L. β. spadicea mihi, spiculis pubescentibus spadiceis, foliis, nisi ad vaginæ commissuram, glabris.

H. In graminosis M. Fünelen, prope pagam.

Obs. Specimina omnia Helvetica, qua possideo, panicula viridi-flavescenti, spiculis glabris punctatis, et foliis pubescentibus gau-

dent ; sed in spec. Britannicis fere omnibus, spiculæ vage longeque pilosæ et folia glabriuscula sunt.

70.* *Crocus* vernus, All. var. albiflorus.
H. Zermatt.

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71. *Nigritella* angustifolia, Rich.
H. In alpibus supra Tæsch : in graminosis M. Gemmi supra Schwarrenbach. 30 August 1836.

72. *Chamorchis* alpina, Rich.
H. In graminosis M. Gemmi supra Schwarrenbach et ad lacum Dauben. * in alpibus supra Zermatt.

73.* *Habenaria* viridis, R. Br.
H. Zermatt.
Obs. In alpibus spica sæpe rubescit.

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74. *Luzula* campestris, DC. ζ. nivalis Koch. Deuts. Fl. ii. p. 602. L. campestris β. latifolia Ser. Gaud. L. campestris, β. alpina, Gaud. Agrost. exc. syn. L. campestris γ. nigricans, Gaud. Helv. exc. syn. plur. L. campestris alpina Ser. exsic !
H. In M. Gemmi in uliginosis summ. M. Schalmette.

75. *L.* spicata, DC. α. major, caule elatiori, spica elongata, interdum interrupta, phyllis capsulisque atrofuscis fere concoloribus. β. minor, cæspitosa, spica subglobosa, phyllarum marginibus capsulisque pallidioribus fere spadiceis.
H. α. in M. Gemmi supra Schwarrenbach. β. ad moles glaciales summi jugi alpium supra Tæsch, cæspites densos efficiens, et inter Lichenes sola phanerogama.
Obs. Capsulæ a Smithio in Eng. Fl. ed. 2da bene descriptæ sunt.

76. *L.* lutea, DC.
H. in graminosis ad moles glaciales, M. Schwarzseeberg.

77. *L.* nivea, DC.
H. In sylvis laricinis inter Zermatt et valleculam Tæsch.

78. *L.* Spadicea, DC.
H. In M Gemmi in saxosis supra Schwarrenbach.

79. *Juncus* filiformis, L.
H. In uliginosis torfaceis supra Zermatt.

80. *J.* triglumis, L.
H. In uliginosis M. Gemmi supra Schwarrenbach.
Obs. Occurrit bi-quinqueflorus.

81. *J.* Jacquini, L. α. minor, semipedalis pedalisve. β maximus mihi, sesquipedalis et ultra, perianthiis pallidioribus, fuscescentibus.

H. α. In uliginosis M. Gemmi supra Schwarrenbach et in summ. M. Schalmette: in alpibus supra Zermatt, et Tæsch. β. copiose inter saxa in alp. supra Tæsch.

Obs. 1ma. In var. α, Capsulæ semper immaturæ, perianthiis multo breviores. In var. β. Capsulæ maturæ, perianthiis æquales vel sublongiores, capitulaque interdum longiuscule pedunculata, curvato-reflexa, hemisphærica vel subglobosa.

Obs. 2da. Fructus maturus ab auctoribus nondum visus ut videtur e descriptione cl. Gaudini, qui Hostii verba ita citavit: "Capsulæ ovato-triquetræ, angulis superne acutis (in Fl. Helv. ii. p. 561—"Alatis" in Agrost. ii. p. 233,) obtusæ, polyspermæ." Koch, in Deuts. Fl. ii. p. 593, capsulas, ex observationibus cl. Wahlenbergii, acutas perianthiis duplo longiores descripsit. Duby in Bot. Gall. i. 477, etiam capsulam forsan immaturam male descripsit "perigonii segmentis lanceolatis acuminatis capsulam ovoideam obtusam mucronatam subsuperantibus," ut nonnisi longitudine perianthii a. J. castaneo Sm. distinguendus, sed notas optimas omnino neglexit ut e descriptione sequenti patet. Capsula, perianthio vix longior, obtusa profunde emarginata, obtuse-triquetra, angulis valde compressis canaliculatis fere alatis. Stylus longiusculus ex emarginatura persistens. Semina parva ovalia tunicata, tunica utriusque longe producta curvata. In exempl. M. Gemmi, Faulhorn, &c. et in omnibus in Herbario meo conservatis, capsulas semper immaturas inveni: in var β. capsulæ omnes maturæ sed quoad longitudinem paulo variabiles sunt.

82. *J.* trifidus, L. α major, 1—3 florus. β minor, uniflorus. J. monanthos, Jacq.

H. α in sylvula ad viam inter St Nicholas et Zermatt. β. In alpibus supra Zermatt ad moles glaciales.

83. *J.* bufonius, L.

H. ad viam inter St Nicholas et Zermatt.

84. *J.* fusco-ater, Schreb Koch. J. ustulatus, Hoppe. β. alpinus, panicula simpliciuscula. J. alpinus, Vill.

H. In uliginosis, M. Schwarzseeberg.

85.* *Tofieldia* borealis, Wahl! T. palustris, Huds. et auct. Britannicorum?

H. In alpibus supra Zermatt.

Obs. Omnino congruit cum planta arctica a cl. Wahlenberg et Agardt missa, et, ut Anthericum calyculatum a cel. Thunberg. Planta Scotica tantum recedit racemo laxiori, multifloro, et perianthio magis obtuso coloratoque.

86. *T.* calyculata, Wahl. *α.* vulgaris, perianthio acutiusculo. *β.* glacialis, Thom. exs. T. glacialis, Gaud. Helv. ii. p. 596, perianthio obtuso, floribus longius pedicellatis. *γ.* ramosa, Thom. exs. T. glacialis, *β.* ramosa, Gaud. l. c. perianthio obtuso, floribus longius pedicellatis, pedunculis infimis productis multifloris, bracteolato-squamosis.

H.* *α.* In alpibus supra Zermatt. *β* and *γ* in graminosis humidis M. Gemmi prope die Wintereck. 29 August 1836.

Obs. In *β.* perianthium sæpius purpurascit. Planta variabilis, et persuasas sum T. glacialis, Gaud. mere forma alpina nec species diversa: sed non confundenda cum T. boreali, Wahl. species distinctissima Europæ septentrionalis alpiumque excelsiorum Helvetiæ incola.

87.* *Colchicum* alpinum, DC.

H. Zermatt.

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88. *Ornithogalum* fistulosum, Ram. Koch. Gagea—Rchb. O. Liottardi Sterub. Gaud.

H. Rarissime ad nives deliquescentes M. Gemmi supra Schwarrenbach.

Obs. O. fistulosum, Gaud. e Rchb. fl. germ. exc. No. 735 ad O. arvensem, Pers. pertinet. Spec. nostra certe omnino cum descriptione sua O. Liottardi convenit.

89. *Allium* acutangulum, Willd. Rchb. Germ. exc. No. 767.

Pl. Crit. 8. Ic 977. (sed culmus nimis elatus.) A. acutangulum *β.* montanum, Koch. A. angulosum *α* petræum, Gaud.

H. In arvis et incultis ad moles glaciales supra Zermatt.

Obs. Perianthium saturatius coloratum quam in spec. e Jurasso. Filamenta alterna basi dilatata, petalaque acutiusculo-cuspidata.

90. *A.* vineale, Sm. Gaud.

H. cum præcedenti.

Obs. E. sententia Kochii et Rchb. idem cum A. arenario auct. planta a cl. Thomasio sub hoc nomine accepta videtur diversa; sed genus Allium e sicco fere inextricabile.

91. *A.* oleraceum, L. Gaud.

H. cum præcedentibus.

Obs. Spatha foliolis longissimis e basi ovata dilatatis nervosis, attenuatis; folia certissime fistulosa staminibusque inclusis. Forma spathæ in spec. meis hujus et species sequentis differt et ab icone Rchb. pl. crit. 5. ic. 601 et 602, et a descriptione Gaudini.

92. *A.* carinatum, L. Gaud.—*β.* ? umbella mere bulbifera.

H. cum præcedentibus.

Obs. Spatha, foliolis prælongis inæqualibus basi ventricosis nervosis: folia e sicco plana videntur; floribus non evolutis, sed umbellæ bulbi feri maturi. In var. β.? Bulbilli magis elongati tenuioresque sunt, et spatha magis senescens, ut suspicor potius ad A. paniculatum Auct. Helv. referendum, cujus varietatem bulbiferam olim in Jurasso supra Biennem legi.

93. *Anthericum* serotinum, L. Lloydia—Rchb.

H. In alpibus supra Tæsch.

94.* *A.* Liliastrum, L. Czackia—Andrz. Rchb.

H. Zermatt.

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95. *Asparagus* officinalis, L.

H. In incultis inter Inden et Varen.

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96. *Larix* Europæa, DC.

H. Inter Inden et Varen—etiam in Valesia superiori prope Brieg, &c. et in valle D. Nicolai sylvas magnas efficit.

97. *Pinus* Cembra, L.

H. In M. Fünelen—Sylvula unica.

98. *Juniperus* Sabina, L. α erecta, β. prostrata.

H. α. Inter Visp et Stalden consort. Hippophae rhamnoides. β. In alpibus supra Zermatt copiose.

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99. *Betula* alba, L. δ. verrucosa (Ehrh ?) Gaud.

H. copiose ad rivulos et in glareosis inter St. Nicholas et Zermatt.

Obs. Differt a B. albæ forma vulgari foliis duplo majoribus dorso glandulosis, ramis ramulisque glanduloso-verrucosis—An B. verrucosa Ehrh. cum B. pubescenti a cl. Rchb. conjuncta? Planta helvetica certe non ad pubescentem sed ad B. albam referenda.

100. *Alnus* incana, Willd.

H. prope Kandersteg.

Obs. Forma monstruosa squamis foliaceis.

101. *Quercus* pubescens, Willd.

H. In collibus apricis prope Siders.

Obs. Folia ramorum juniorum nullo modo basi inæqualiter cordata, sed subtruncata vel in petiolum attenuata, sinuato-pinnatifida subtus cano-pubescentia, lobis sinuato-incisis acutiusculis apiculatis vel interdum obtusis.

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102. *Salix* myrsinites, Gaud. Helv. vi. 263. S. arbutifolia, Ser. Essai — ♀ ♂. α latifolia, Gaud. l. c. Ser. Sal. exs. Rév. inéd N. 32 β!

—β. angustifolia, Gaud. l. c. S. myrsinites, α arbutifolia, Ser. Sal. exs. Rèv. inéd. No. 32, α !—δ. lanata, Gaud. l. c. S. myrsinites γ. pilosa, Ser. l. c. No. 32, γ.

H. α. et β. Ad moles glaciales M. Fünelen ; β. in M. Gemmi ad lacum infra Schwarrenbach ; δ. in M. Gemmi supra Schwarrenbach (forma pilosa) et ad moles glaciales Lammerngletscher, 31 August 1836, (forma lanata.)

Obs. var. α. fere forma eadem quam e Scotia ut S. Myrsinites retuli. var. β. variat amentis fœmineis brevibus crassis. et elongatis gracilioribus, interdum dense sericeis : foliis maturis glaberrimis lucidis vel junioribus, præsertim subtus, subsericeis. In var. δ. folia interdum mere pilosa, interdum lana subsericea densa utrinque tecta sunt.

103. *S.* serpyllifolia, Scop ♀.

H. Ad moles glaciales M. Schwarzseeberg et M. Fünelen.

104. *S.* hastata, L. Wahl ! ♀ ♂. non Hoppe. S. Ludwigii Schleich !

H. Ad moles glaciales supra Zermatt.

Obs. Folia basi inæqualiter rotundata, interdum subattenuata. S. hastata Hoppe exs. ! videtur potius S. phylicifoliæ var.

105. *S.* Monandra, Hoffm. Gaud. var. ramis junioribus, foliisque subtus cæsio-pruinosis.

H. Ad ripas Vispæ prope Zermatt.

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106. *Euphorbia* Gerardiana, Jacq.

H. In incultis inter Varen et Siders.

107. *E.* falcata, L.

H. In arvis incultis prope Siders.

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108. *Empetrum* nigrum, L.

H. In M. Fünelen.

Obs. Specimina omnia hermaphrodita, stamina nempe sub bacca matura persistentia inveni. In Jurassi M. Creux du Van specimina omnia, et permulta legi, dioica observari : differunt autem paululo a planta alpina habitu laxiusculo, caulibus nempe multo minus lignosis, foliisque remotioribus, longioribus angustioribusque. Planta Suecica, a cl. Thunberg missa, et Hibernica, in torfaceis Cunnamara lecta, videntur dioicæ, sed specimina mea nimis manca.

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109. *Thesium* alpinum, L. α. racemis secundis, bracteis flores superantibus. β. racemis secundis, bracteis floribus brevioribus.

H. α. In M. Funelen. β. In M. Gemmi ad lacum infra Schwarrenbach.

Obs. In Jurasso varietatem racemis non secundis cauleque elatiori sæpe legi, quæ mihi var γ. floribus sparsis.

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110. Hippophae rhamnoides, L.

H. Ad Vispam inter Visp et Stalden, copiose.

Obs. Plantam prope Aberlady in comitatu Haddington lectam ab am. Macnab accepi, quæ a nostra Helvetica et ab alteris Britannicis recedit, foliis duplo latioribus baccisque facile duplo majoribus.

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111. *Oxyria* reniformis, Hook.

H. In M. Gemmi ad rupes prope nives perennes M. Schalmette.

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112. *Chenopodium* olidum, Curt. C. fœtidum, Lam. Gaud.

H. In fossis exsiccatis ad viam prope Siders.

113. *C.* album, L. α. vulgare.—β. concatenatum, Gaud. foliis angustioribus subintegerrimis (integerrimis acutis apiculatisve) racemis elongatis gracilibus, glomerulis globosis subdiscretis (remotiusculis.)

H. α. inarvis supra Zermatt. β. ad viam inter Stalden et St Nicholas.

Obs. In var. β. caules prostrati, viridi et albo fasciati. Hac, var β. riparium Bngh. in Rchb. Germ. exc. No. 3740 β.

114. *C.* Botrys, L.

H. In carbonariis ad viam inter Siders et Leuk. In arenosis inter Stalden et St Nicholas.

115. *C.* hybridum, L.

H. In vineis prope Varen.

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116. *Plantago* major, L. γ. brachystachya, Koch. Deutsch. Fl. i. p 801. T. minima, Thom. exs! non DC. P. uliginosa, Baumg! (vix diversa.)

H. In uliginosis ad viam inter St Nicholas et Zermatt.

Obs. Spica pauciflora congesta ovato-oblonga, scapo folia 5–7-nervia crassa parva superante; rhizoma crassum. Huc pertinere videtur icon Tabernæmontani 1107, f. 2. Ad var. δ. microstachyam, Koch. l. c. pertinet T. minima, DC. Fl. fr. scapo debili foliis trinervis breviori, spica pauciflora (vix ultra 6-flora) floribusque laxis. Scapi interdum petiolis breviores; radix fibrosa tenuis. Hanc varietatem tantum ex ulignosis Jurassi prope Delemont lectam accepi, et in ulignosis torfaceis Hiberniæ prope Renvyle Cunnamara legi.

117. P. montana, Lam. P. atrata, Hoppe exs.!

H. In M. Gemmi in graminosis ad lacum infra Schwarrenbach.

Obs. Non confundenda cum var. humili P. lanceolatæ.

118. P. holosericea, Gaud. in Roem. et Schult. Syst. iii. p. 126. P. montana β? holosericea, Gaud. Helv. i. p. 400. T. saxatilis β holosericea, Rchb. Germ. exc. No. 2677 β.

Plantago, foliis lineari-lanceolatis 5–7-nervis subintegerrimis, scapis pilis patentibus lanuginoso-hirsutis, spica densa multiflora, ovato-globosa, bracteis latissimis subrotundis nervo viridi valido percursis apice longe ciliatis immarginatis. α. foliis glabriusculis. β. foliis lanuginoso-hirsutis.

H. α In glareosis M. Gemmi ad moles glaciales Lammerngletscher, copiose, 31 Aug. 1836. β. In glareosis M. Gemmi supra Schwarrenbach, 1835, et cum var. α. 1836.

Obs. A. P. montana, Lam. præter notas indicatas, spica densissima multiflora, foliis multo latioribus et longioribus staturoque majori crassiori abunde differt. P. saxatilis, M. Bieb! quacum conjungit cl. Rchb, primo visu differt, bracteis latissime scarioso-marginatis, et, nisi fallor, corolla pilis obvallata at indicavit cl. auctor. Pl. argenteæ, Lap. (spec. unicum e Pyrenæis ab Endressis lectum possideo) vix varietas: in P. argentea, Lap. folia sunt dense argenteo-sericea, bracteæque scarioso-marginatæ vix coloratæ. Pl. victorialis (an vera?) e Dalmatia a Pettero missa etiam differt, spica ovata, floribus minoribus, scapo elatiori, foliis brevioribus latioribusque et habita omnino P. lanceolatæ.

119. P. lanceolata, L. β. hungarica, Rchb. Germ. exc. No. 2678 β. P. hungarica, Walds. et Kit!

H. In arenosis ad Rhodanum prope Leuk.

Obs. Scapi numerosi decumbentes, 4–5 unciales; spica brevis ovata, bracteæ acuminatæ hyalinæ, folia vix duas lineas lata, brevia, lanugine alba tecta vel glabriuscula et ad collum radicis lanugine copiosa longa intertexta.

120. P. alpina L. Var. rigida, rhizomate incrassato, lignoso. P. bidentata β, γ humilis, Gaud?

H. In pascuis aridis inter Zermatt et St Nicholas.

Obs. Radix sæpe odorata fere ut in Gnaphalio graveolenti.

(To be continued.)

II.—*On the Dentition and other Characters of the British Shrews, with reference to M. Duvernoy's recent researches into the structure of this genus of Animals.* By the Rev. Leonard Jenyns, M. A., F. L. S., F. Z. S., &c.

In the preface to the "Manual of British Vertebrate Animals," published in 1835, I alluded to the *Shrews* as one of those groups, the species of which required further investigation. I was led to

think so by the circumstance of my having observed great differences amongst individuals usually considered as belonging to the same species, and the belief that we had not attained to a knowledge of the true value of those characters with which such differences were connected. I had not, however, at the time the means of throwing any further light on the subject. I was afterwards in hopes that this might have been afforded by Mr Bell, whose accurate work on the *British Quadrupeds*, now in course of publication, is probably familiar to all who are interested in the matter under consideration. M. Duvernoy had also in the meantime published a memoir on the structure of these animals, which promised to afford much assistance in the inquiry. It does not appear, however, that the gentleman first alluded to had become acquainted with M. Duvernoy's memoir in time to avail himself of any information therein contained, before the publication of the third part of the "British Quadrupeds," in which the indigenous species of the genus *Sorex* are illustrated. The subject consequently remained where it was; Mr Bell at the same time joining in the belief that it stood in need of some further investigation, although not himself in possession of the requisite facts to enable him at that time to undertake the inquiry.

It was under these circumstances, and on the occasion of my being enabled to consult the entire memoir of M. Duvernoy, of which I had previously only seen an abstract, that I determined a short time since carefully to examine anew the characters of the British species of this genus. I had also been fortunate in obtaining a few specimens in addition to those which I possessed at the time of publishing the Manual above alluded to. The result of my inquiries is what I purpose to communicate in the present paper; and if I have not succeeded in establishing any species which may be considered as new, I yet trust I shall be the means of drawing the attention of naturalists to a few facts respecting the dentition of those hitherto met with in this country, which, when considered in connexion with M. Duvernoy's researches, must lead us to alter our opinion respecting their supposed identity with others met with on the Continent.

I may commence by stating that M. Duvernoy's memoir, which is entitled "Fragmens d'Histoire Naturelle systématique et physiologique sur les Musaraignes," is contained in the second volume of the Transactions of the Natural History Society of Strasburg. The memoir bears the dates of June and December 1834, although, I believe, it was not published until the following year. Its lead-

ing object is to make known the existence of three distinct *types of dentition* existing amongst the shrews, and to direct attention to the characters afforded by the teeth, as much more deserving our confidence than some of those usually resorted to for establishing specific differences in this genus. It has been the practice of naturalists, in describing these animals, to dwell too much on the colour of the fur, and on the form, as well as the relative length of the tail. M. Duvernoy has shown that these points afford very uncertain characters; and my own recent examination of numerous specimens leads me to accord entirely with his opinion. Not only does the colour of the fur vary in its tints with age, sex, and season, but in the mode according to which the tints are distributed. M. Duvernoy observes, that in some individuals of the *S. araneus* the under parts of the body are pale grey, whilst in others these parts are the darkest. He adds, that the upper parts of the body will vary in the same species from greyish-brown or black to a decided red. My own observation has led me to remark further, that the colours are not even constant in individuals of the same age; nor is there apparently any fixed relation between the period of growth and the nature of the prevailing tint. In some instances I have noticed young individuals as dark as, or even darker than, full-grown specimens of the same species; in others, young which were of a lighter rufous than any adult that I had ever met with. The characters of the tail, at least those derived from its form, seem to depend chiefly upon age. It is generally shorter in proportion, and always thicker, in young than in old individuals. This last circumstance is due in part to a copious growth of elongated bristly hairs, which closely surround the tail in young specimens, at the same time standing rather out, but which either fall as age advances, or become so worn from friction as finally to leave this part, in very old individuals, nearly naked. It is also manifestly due to a greater plumpness of the tail at this period. In after life, the muscular portions, as well as the investing skin, sometimes shrivel, so as to render the angles of the included vertebræ more apparent; hence entailing not only a diminished thickness of the tail, but, what is equally obvious in adult specimens, a change in its form from cylindrical to nearly square. With reference to this last point, M. Duvernoy observes, and I believe correctly, that the quadrangular form of this part is common to several species, but that it never appears till after a certain age, the tail in young subjects being always round. There is also a stricture sometimes observable at the base of the tail, which it is of importance to notice, because it was considered by Hermann as

the distinguishing character of a peculiar species (*S. constrictus*, Herm.), which, however, according to Duvernoy, who has examined the original specimens still preserved in the Museum at Strasburg, proves to be nothing more than the young of *S. araneus* and *S. fodiens*. In fact, this is a character likewise affected by age, if not altogether dependent upon it. The elongated bristly hairs above spoken of are rarely found quite at the origin of the tail, or, if present, are shorter here than elsewhere and more closely appressed. Hence at this point the tail appears thinner; but, from the circumstance of the hairs falling in advanced life, the difference becomes less and less obvious, and in some instances at length ceases to be observed.

I now proceed to notice the different types of dentition which M. Duvernoy has observed in these animals, after which I shall describe more at length the characters of the teeth as exhibited by the species found in our own country.

These types, which are three in number, are regarded by M. Duvernoy as indicative of so many sub-genera, or at least well-marked sections in the old genus Sorex.

I. The first, to which he continues the name of Sorex in a restricted sense, is distinguished by having the two middle incisors in the lower jaw *with an entire or simple edge*, the two corresponding ones in the upper *hooked, or furnished with a spur appearing as a point behind;* the *three or four* small teeth which follow, in the upper jaw, *diminishing rapidly in size* from the first to the last; *none of the teeth coloured.*—To this type belong, amongst other species, the *Sorex araneus* of Continental authors, and the *S. leucodon* of Hermann.

II. The second type (Hydrosorex, Duv.) has the lower middle incisors *with the edge denticulated;* the upper ones *forked, the spur being prolonged into a hook* (*en crochet;*) the small molars above, which are *five* in number, *diminishing insensibly* from the first to the last: *all coloured at the tips.*—Of this group the *S. fodiens* of Pallas is considered as the typical species. M. Duvernoy includes also the *S. tetragonurus* of Hermann.

III. The third type possesses characters in some measure connecting it with each of the two former, on which account it is named by M. Duvernoy Amphisorex. It is distinguished by the lower incisors being *simple*, and the upper ones *hooked*, as in the first type; but the first two of the small intermediate teeth (which are *four* in number) are *equal*, the third somewhat less than these, the fourth rudimentary: the tips of the incisors, as well as those of the molars,

are a little coloured. This type is characteristic of a peculiar species, which M. Duvernoy describes as new, under the name of *S. Hermanni.*

After attentively considering the characters assigned by M. Duvernoy to his three types respectively, it was easy to ascertain to which of them the species of *Sorex* hitherto described as natives of this country by our own naturalists, belonged. The result of the examination was,—*first,* that we have no British species, as yet identified, possessing the characters of his first type, and that therefore the *S. araneus* of English authors is *not the same* as the *S. araneus* of the Continent;—*secondly,* that the species to which it has been the custom here to apply that name, belongs to his second type HYDROSOREX;—*thirdly,* that neither is the *S. fodiens* of this country, judging from all the specimens I had seen, identical with the *S. fodiens* of Pallas, or at any rate of Duvernoy, but that it associates, in respect to its dentition, with the *S. Hermanni* of the author last mentioned under his third type AMPHISOREX.

With the view of establishing these points, which may cause a little surprise with some of our naturalists, I beg to direct attention to the structure of the teeth in each of the several species of the genus *Sorex* hitherto met with in Great Britain.

S. araneus. (Of English Authors.)

That this was probably not the same as the *S. araneus* of the continent, I ventured to suggest in the Manual of British Vertebrate Animals, from the circumstance of *our* species having the teeth *coloured,* which had been said by Geoffroy, in his description of the one found in France, to be *white.* * Mr Bell thought that Geoffroy's statement was erroneous, and that there was not sufficient ground for the above opinion. † It would seem, nevertheless, to be fully confirmed by Duvernoy, who, moreover, notes this character as one of those particularly distinguishing his first subgenus. But were this not so, and were we entirely to disregard the *colour* of the teeth, their *number and structure* would at once serve to separate our own *araneus* from the species bearing the same name on the continent.

The following description is that of the dentition of our *common shrew,* and applies to every specimen I have as yet examined.

The entire number of teeth is twenty in the upper jaw, and twelve

* See *Man.* p. 17, Note. † *Brit. Quad.* p. 110.

in the lower. Of the former, the last four on each side are *true molars*, the second and third of which may be termed perfect, the two others imperfect.* The second and third molars may be regarded as formed each of two triangular prisms, with their summits directed inwards, on which side there is a projecting spur or heel at the base. In the second, the first prism is sensibly smaller than the following one. In the third, the two prisms are equal. The first molar is of a somewhat irregular form. Strictly speaking, there is only the second prism present, of which the posterior side may be regarded as excessively developed at the expense of the two other sides, as well as of the projecting spur within. The first prism is simply represented by a small point or denticle in advance of the second. Viewed in profile, this tooth presents the appearance of a sharp edge with threepoints, and resembles one of the false molars observable in many of the *Carnivora*. The fourth molar is small, and, like the first, formed but of a single prism. In this instance, however, it is the first prism which is present, the second being rudimentary, and exhibiting but one side, which is carried inwards to unite with the projecting spur, which is itself also rudimentary.

Between the molars just described and the two true incisors at the extremity of the jaw, which last, from their peculiar development, form a remarkable feature in the dental system of this genus, are five small teeth on each side, concerning the exact nature of which there has been much difference of opinion. Some authors have regarded them as canines, others as false molars, others again as lateral incisors. Without entering into the merits of this question, which had already been discussed by M. Isidore Geoffroy St Hilaire,† previously to Duvernoy's late memoir, I shall simply state that in the present paper I adopt the opinion of the author last-mentioned, who seems most disposed to regard them as *incisors*, principally from the circumstance of their being almost all implanted in the intermaxillary bone.‡ I shall, therefore, continue to call them, as some have done before me, *lateral* incisors, giving the name of *middle* incisors to the anterior pair of teeth so remarkably distinguished from all others by their form and great development.

* In describing the molars, which appear to be nearly similar in all the species, I have adopted, in a great measure, the language of Duvernoy.

† See *Dict. Class. d'Hist. Nat.* Tom. ii. p. 313.

‡ One argument for *not* regarding them as *false molars* is founded by Duvernoy on their relative proportions. He observes that false molars always increase gradually in size from the first to the most backward. In the instance of these teeth, on the contrary, the first in the series are the largest.

In the species under consideration, the middle incisors are of a compressed conical form, and very much produced, at first taking a horizontal direction, but afterwards curving downwards in a hook-like manner. Each is furnished with a spur or second point, arising from the horizontal portion of the tooth, and which is so much developed as nearly to equal the anterior point in size. Hence this tooth appears forked; and when viewed in the recent animal, and still covered in part with the muscular integuments, the points of the fork might easily be mistaken for two distinct teeth. These middle incisors are widely separated at their origin, but, gradually approaching, touch each other soon after bending to form the descending hook.

The lateral incisors form a closely compacted series, the first reposing in part upon the base of the middle incisor just described, and each one in succession upon that of the tooth immediately preceding. They are of a conical form, the first three having the base surrounded by an elevated margin most conspicuous internally. The first rather exceeds in size the posterior point of the middle incisor in advance; the succeeding ones decrease in a very gradual manner, the last being small and not easily observed.

In the lower jaw the true molars amount to three only on each side, the first being the largest and the last the smallest. Each is formed, as in the upper jaw, of two triangular prisms, with the summits, however, in this instance, directed outwards. In the third molar, the second prism is incomplete.

The two middle incisors in this jaw present a remarkable appearance, being very much produced, and standing out horizontally for nearly their whole length, the extreme tips only being slightly bent upwards. The upper margin, which forms a sharpish edge, exhibits three small denticles behind the main point, and when viewed in profile has a festooned or crenated appearance.

Between the middle incisors and the first molar are two lateral incisors of nearly the same form as those above, but rather more pointed as well as lengthened. The second, moreover, presents the rudiment of a second point, though so little obvious as scarcely to deserve notice, were it not for the circumstance that in the next species this second point attains a considerable development. The first of the lateral incisors, which is smaller than the other, rests in a great measure upon the base of the middle incisor preceding it. The second, in like manner, rests partly upon the first.

All the teeth in this species have their salient portions more or less deeply tinged with brownish red. In the case of the middle

and lateral incisors, it is more especially the tips and the outer surface which are thus coloured. It is also the outer surface in the lower molars; but in the upper molars it is principally the inner surface, and the internal elevated ridges which form the spur. In some specimens the colouring is very slight on the lateral incisors, but it may always be readily observed on the other teeth.

On the whole, the dental formula for this species will stand thus:

Mid. Inc. $\frac{2}{2}$; lat. Inc. $\frac{5}{2} : \frac{5}{2}$; mol. $\frac{4}{3} : \frac{4}{3}$; $= \frac{20}{12}$.

S. fodiens. (Of English Authors.)

In this species, the entire number of teeth is two less than in the one last described. The molars are the same, both as regards number and form, above and below; but a considerable difference appears in the middle and lateral incisors.

The former, in the upper jaw, are larger in relation to the other teeth, and more curved. The first point is also much more developed than the second; which last appears only as a short though sharp spur, and ceases to convey the impression of the entire tooth being forked. This spur is, however, itself distinctly furnished with a very minute second point, of which there is scarcely a rudiment in the last species. These middle incisors are less divaricated at their origin than in the *S. araneus*, and meet each other sooner, though in some individuals without actually touching. Their inner margins exhibit at their point of contact a small process, which may be also observed in *S. araneus*, but which is more obvious in the species under consideration.

The lateral incisors in this jaw are only four, and but three of these are readily seen, the fourth being extremely small, and placed rather within the line of the adjoining teeth, by which it is in part concealed when viewed from without. They are of a compressed triangular form, with the base more dilated than in the *S. araneus*. The first two are of nearly equal size; the third somewhat smaller.

In the lower jaw, the middle incisors are even more produced than in the *S. araneus*, and equally horizontal in their direction. The upper margin is almost entire, presenting only near its base one obtuse denticle, seldom very conspicuous, and apparently the less so as age advances.

The lateral incisors in the lower jaw are two in number, as in the case of the last species. The second is also the largest; but this tooth, as already mentioned, differs from its corresponding one in the *S. araneus* in having its posterior or secondary point considerably developed.

The teeth are all more or less coloured as in the last species. The dental formula is as follows:

Mid. Inc. $\frac{2}{2}$; lat. Inc. $\frac{4}{2} : \frac{4}{2}$; Mol. $\frac{4}{3} : \frac{4}{3}$; $= \frac{18}{12}$.

S. remifer. (Of English Authors.)

Of this species I have only been able to examine accurately the dentition of a single specimen. It does not differ materially from that of the *S. fodiens* last described. The processes on the inner margins of the upper middle incisors are rather more developed, and it is by means of these processes only that the two teeth approach one another. The fourth lateral incisor in the upper jaw is also a trifle larger, and terminates upwards in a more decided point. The lower middle incisors have their upper margins perfectly entire, not exhibiting even the rudiment of a single denticle. The colouring of all the teeth is the same, but in the specimen examined, not very intense.

After the details above given, it is hardly necessary to dwell on the essential differences between the first two of our British species and the two continental ones bearing the same names. It will be readily seen, on referring to the characters of Duvernoy's three types, that they differ particularly in the form of the middle incisors in both jaws, and in the number, as well as in the relative size of the lateral incisors above. The difference in number amounts, in the case of the *S. araneus,* to as many as four. It is in fact not a little singular that the dental system of our *araneus* should be nearly coincident with that of the continental *fodiens*; while that of our *fodiens,* though not exactly the same (in as much as it clearly belongs to Duvernoy's *third* type,) should yet closely approach the dentition of the continental *araneus.* But besides the distinctive characters afforded by the teeth, there are others observable in the form of the cranium. Of this I judge from a comparison of Duvernoy's figures of this part with the same part in our British specimens. In the instance of the *S. araneus,* the cranium is slightly larger in all its dimensions, but especially wider across the snout and less attenuated, than in the *araneus* of this country. In the *S. fodiens,* it is decidedly smaller, and the proportions of the snout not so considerable.

But if our British species be not the same as the *S. araneus* and *fodiens* of continental authors, it will naturally be asked,—to what other species we are to refer them? To this inquiry, at least as regards one of them, it is not so easy to return a direct answer, until

all those noticed by different authors shall have had their dentitions examined with reference to the three types indicated by Duvernoy. Our most common species, the so-called *S. araneus*, which, as before stated, unquestionably belongs to the second of the above types (*Hydrosorex*,) I have little doubt is synonymous with the *S. tetragonurus*, the only other noticed by Duvernoy under that section, besides the true *S. fodiens* of Pallas and himself, from which it is clearly different. M. Duvernoy has given a description of this species, as well as a coloured representation of the entire animal, and though this last may appear at first sight larger than our *araneus*, as well as slightly different in some other respects, yet it accords exactly with specimens of a rather unusual size obtained by me from the fens of Cambridgeshire, to which I shall have occasion to refer presently. His description is for the most part of a relative nature serving to distinguish the *S. tetragonurus* from the *S. fodiens*. Hence it will not admit of direct application where we have not the last-named species with which to contrast it. But so far as it can be judged of, it would seem to favour the opinion I have above hazarded. Thus he observes that it is distinguished, in the first place, by its much smaller size; secondly, by the form of the snout, which is narrower and more elongated; thirdly, by the form of its feet, which are less thick and less broad than those of the *S. fodiens*. *Lastly*, he notices some slight differences in the teeth compared with those of the species just mentioned. One of these consists in the first denticle on the margin of the lower middle incisor being so little removed from the point of that tooth as to appear but as a lobe of this last, and to give in consequence to the extremity of the tooth a bilobated character. Another difference consists in the denticle of the second lateral incisor in the lower jaw being less developed. With respect to the last two peculiarities, of the former it is not easy to judge without knowing its appearance in the *S. fodiens*, but I conceive it will be hardly thought inapplicable to our species, in which I have already noticed (when describing its dentition) three denticles arranged in a series behind the main point of the tooth in question, to which last the first is sufficiently approximated to convey the appearance above alluded to by Duvernoy. To the latter,—the rudimentary state of the second point in the second lateral incisor below,—I have in like manner already drawn attention.

M. Duvernoy assigns the following dimensions to the *S. tetragonurus*:

	Millim.	*Inc. Lin.*
Length of body,	0,070	= 2 9¼
of tail,	0,045	= 1 9½ nearly.
From the orifice of the ear to the end of the snout,	0,021	= 0 10, or more.
From the eye to the same point,	0,010	= 0 4¾;

which are not very different from those of many individuals of our common species, which last varies very much in this respect,—in the relative length of the tail and body especially.

The *S. tetragonurus* was first described by Hermann, in 1783, from specimens found in the neighbourhood of Strasburg by the celebrated Dr Gall. To his work, entitled *Tabula affinitatum Animalium*, I have had no access. The species, however, has been subsequently noticed by several other authors besides Duvernoy, in whose descriptions I find scarcely any thing at variance with the characters of the *S. araneus* of this country. Geoffroy's, indeed, is almost the only one which appears founded upon original observation.* And one remark of his, relating to the teeth, which perhaps may be thought not strictly applicable to our species, it will be right to notice. He states that all the canines, (by which name he designates what in this paper are called lateral incisors) are of equal size. But it must be remembered, that he is here, as well as in most other parts of his description, contrasting the *S. tetragonurus* with the *S. araneus* of the continent, in which last, according to Duvernoy, the teeth in question diminish in size very rapidly. Hence the expression must not be taken strictly, and according to the letter. As to the form of the tail, which has obtained for it its name, and which is much dwelt upon by Geoffroy, we have already shown that this is not in any case to be depended on. The dimensions given by him are:

Length of body 60 millimetres = 2 inc. 4⅓ lin. nearly.
tail 40 = 1 inc. 7 lin.

which differ from those of Duvernoy, shewing that in this respect the *S. tetragonurus* is equally variable as our British *araneus*. Its tendency to vary in other respects also, we may gather from the account of this species by Isidore Geoffroy St Hilaire in the *Dictionnaire Classique d'Histoire Naturelle*,† where, after repeating several of the characters already noticed by Geoffroy, he states that he has examined many individuals apparently referrible to it, in which he

* Memoire sur les espèces de genre Musaraigne.—*Ann. du Mus.* Tom. xvii. (1811,) p. 177, pl. 2, f. 3.

† Tom. xi. p. 320.

observed considerable differences of colour. Both authors speak of it as being found in nearly the same situations as the *S. araneus*,—in barns, gardens, &c. the latter adding that it is not of unfrequent occurrence.

Desmarest, * Fred. Cuvier, † and Fischer, ‡ in their descriptions of the *S. tetragonurus*, add nothing to what had been previously said by Geoffroy.

Although I have referred above our British *araneus* to the *S. tetragonurus* of Duvernoy, I think it not impossible it may still be the same as the *S. araneus* of Linnæus. This indeed cannot be inferred from the brief description in the twelfth edition of the *Systema Natura*, in which there is no mention made of the teeth. But in the *Fauna Suecica*, (edit. 1761,) he speaks of the upper middle incisors as *bifid* and curved, the lower ones *serrated*; the canines (lateral incisors) in the upper jaw as *four* in number, and very small. These characters are not inapplicable to our species; for although there are really *five* lateral incisors above, the fifth is so minute as readily to escape observation. M. Duvernoy was led by the description in the work last referred to, to consider the Linnæan *araneus* (the only European true *Sorex* known to the Swedish naturalist,) the same as the species afterwards called *fodiens*; but this is explained by the circumstance of *his* (Duvernoy's) *fodiens* having in fact the *same dentition* as *our* araneus; and he seems to have been more impressed with the idea that it was distinct from *his* araneus (which it certainly is) than with the possibility of its being his *tetragonurus*, with which, as above shewn, *our* araneus ought probably to be associated.—But however this may be, as there is some doubt attached to the Linnæan species, I should feel inclined in this, as in all similar cases in which there have been two or more species confounded under the same name, *to continue that name to that one in particular which has been best characterized by subsequent authors*. Hence, without any reference to Linnæus, I should propose suffering the name of *araneus* to remain with the species so well described by Daubenton, Geoffroy, and Duvernoy, and calling ours (at least till it be shewn that it is *not* the species so designated by Hermann,) by that of *tetragonurus*.

We must now proceed to make some remarks respecting the *S. fodiens* of this country, which, as before stated, it is hardly possible, in the present state of the subject, to identify with complete cer-

* *Mammal.* p. 150. † *Dict. des Sci. Nat.* Tom. xxxiii. p. 425.
† *Synops. Mammal.* p. 253.

tainty in the descriptions of foreign authors. In fact it is quite clear that, in this instance also, there have been at least two, if not more, species confounded; sometimes under the name of *S. Daubentonii*, at other times under that of *S. fodiens*. The former name, I believe, originated with Erxleben,* by whom it was applied to the *Musaraigne d'eau* of Daubenton, † which is probably the same as the species described subsequently under the same name by Geoffroy and many of the French writers, but by Hermann under that of *S. carinatus*, and by Duvernoy, in his recent memoir, under that of *S. fodiens*. The latter (*S. fodiens*) was first given by Pallas to a species discovered by himself near Berlin, of which he sent several prints to Pennant, who considered it the same as the *water shrew* of this country, but of which the exact characters had not then, and, so far as I am aware, have never since been published.‡ Hence we have not the means of judging what Pallas's species really was. If Duvernoy is right in regarding it to be the same as his, from which ours is decidedly different, it is at once evident that the name of *fodiens* no longer of right belongs to the *British* species. Whether ours be the *fodiens* of any other author subsequent to Pallas, is a distinct question; and that it is, there are strong grounds for believing, of Gmelin in particular, whose characters of the teeth will not accord with those of Duvernoy's *fodiens*, but are very nearly similar to those of our own. It must, however, be mentioned, that several new aquatic species of *Sorex* have been indicated of late years by the continental naturalists, which tends to make the inquiry more preplexing. Brehm has briefly described three, in addition to one which he considers as the *S. fodiens* of Bechstein, in the periodical conducted by himself under the title of *Ornis*. § More recently, a sketch of a new arrangement of the shrews by Wagler|| has been published in the *Isis* of 1832. In this last essay, the species are distributed under three distinct genera, somewhat analogous to Duvernoy's subgenera; and judging from the characters of the teeth assigned to one of them, (*Crossopus*, W.) in which he places the *S. fodiens*, I think it probable that the species intended under this last name, (considered by him as synonymous with the

* *Systema Regni Animalis. Class. I. Mamm.* Lips. 1777. p. 124.

† *Mém. de l'Acad. des Sci. de Par.* 1756, p. 211, pl. 5. f. 2.

‡ See *Penn. Hist. of Quad.* (Edit. 1793.) Vol. ii. p. 225, note.

§ The characters of these four species will be also found in *Bull. des Sci. Nat.* 1827. Tom xi. p. 287.

|| Said to have been found after his death amongst his manuscripts. A brief abstract of the arrangement is given by Duvernoy at the conclusion of his memoir, with remarks. There only have I seen it.

fodiens of Brehm) may be the same as the *fodiens* of this country. But it will be unprofitable at present to pursue this inquiry further. And until we have a more exact knowledge of the characters of those species to which the name of *fodiens* has been applied abroad, I think it would be advisable to abstain from applying that name to our own species, or at least considering this last as necessarily identical with any of the above. One thing is certain ;—that it is *not* the *S. fodiens* of Duvernoy, which is probably synonymous with the *Musaraigne d'eau* of the other French authors. If it be asked by what name we *are* to call the water shrew of this country, I would propose, (at least for the present) restoring to it that of *bicolor* ; a name originally given to it by Shaw, *—one extremely applicable, and, so far as I know, not adopted by any foreign author as a name for any of the species met with on the continent.

With respect to the *S. remifer* of this country, I have nothing new to adduce on the subject of its synonymy. In Duvernoy's memoir there is not the slightest mention made of this species, by which we can get a clue to the dentition of the one originally so named by Geoffroy, or the section to which it belongs in his own arrangememt. I shall simply state, that, judging from the slight differences in the teeth already alluded to, added to its other characters previously established, I feel strengthened in the opinion of its being really distinct from our *S. fodiens,* to which, however, it is at the same time *very closely* allied.

Having endeavoured in the preceding pages to elucidate the characters, and to rectify the nomenclature, of our three British Shrews, I am anxious now to direct attention to two varieties of our most common species (*araneus* of authors,) met with in my own neighbourhood, and which, had they occurred to persons not very conversant with these animals, might easily have been regarded as distinct. The first which I shall notice is one already alluded to in a former part of this paper as remarkable for its size.

Var. 1.—Dimensions as follows :—

	Inc.	*Lin.*
Length of the head and body,	3	1
of the head,	0	11
of the tail (to the end of the bone,)	1	7
of the hind foot (from the heel to the extremity of the claws,)	0	6½
of the fore foot (from the wrist in like manner,)	0	4
of the ears,	0	1¾
From the eye to the anterior margin of the orifice of the ear,	0	4
to the tip of the snout,	0	4¾

* *Nat. Misc.* Vol. ii. pl. 55.

Notwithstanding this variety exceeded in bulk and *entire length* any individuals of its kind I had before met with, it will be observed that its head and tail taken separately were each *shorter* than in either of the specimens of which the dimensions are given by Mr Bell and myself in our respective works. It proved to be a female which had recently produced young, the nipples being distended and very prominent; and all its characters, as regards size and form, clearly shewed that its peculiarities were due simply to age. Its *snout* was very much attenuated, (thus confirming a remark of M. Duvernoy, that this part is always thicker in young subjects): the *tail* distinctly quadrangular, somewhat flattened horizontally towards the tip; not nearly so stout as in ordinary specimens; almost naked; the investing hairs being worn to the stumps, closely appressed, and not extending at the tip more than $\frac{3}{4}$ths of a line beyond the bone. The *teeth* in like manner indicated age: the upper middle incisors were completely ground down to their point of contact, (giving the appearance of their being more than usually divaricated at their origin;) the lower ones possessed but two denticles on their upper margin, the first of the three ordinarily present having become obsolete from use. The *colours* (which, however, in this instance had probably nothing to do with age) were also rather peculiar in this variety. They were distinctly of three kinds: that of the sides being separated from the colour of the back by a well-defined line, originating at the hind quarter, thence passing straight onwards to the shoulder, where it inclined upwards, terminating finally at the ear. The parts above the line were of a very dark red-brown, approaching to black, with a few cinereous hairs intermixed;—the sides themselves reddish ash;—the parts beneath cinereous, or dirty white, with a faint tinge of yellow: region of the anus dusky.

With the above specimen, which was procured from Burwell Fen in Cambridgeshire, I think in the month of June, I received a second, also a female, closely resembling it in all its essential characters, but not quite so large. The length of the head and body was 2 inc. 9 lines; that of the tail 1 inc. 9 lines, *this being the same as in the former instance.* The snout was equally attenuated, and the tail equally quadrangular as well as naked. The colours were somewhat different; the upper parts being generally paler, and the sides darker, the boundary-line visible but not very distinct: the back, however, was variegated with two or three large jet-black patches. It is worth adding, that in both of the above specimens, the ears were quite as short as in common specimens, almost entirely con-

cealed, and without any white spot; the feet and tail not ciliated, (although met with in the heart of a marshy district subject to inundation;) nor the former relatively larger than in common specimens.

The other variety to which I would direct attention was taken in the same fen, and at the same time, as the preceding. Of this I likewise obtained two specimens, of different sexes, however, the female being big with young. They were quite similar; but both, in general appearance, extremely different from those last described, as also from most others I had previously seen. Their chief peculiarity consisted in their bright rufous colour, with several indications of their being young, or at least hardly adult individuals, although quite as large as, or indeed in some respects larger than, the specimens of our common shrew usually met with.

Var. 2.—Dimensions :—

	Inc.	*Lin.*
Length of head and body,	2	6
of head,	0	11½
of tail (to end of bone,)	1	7
of hind foot,	0	6½
of fore foot,	0	4
of ears,	0	1½
From eye to orifice of ear,	0	3
to the tip of snout,	0	4¾

The above measurements are those of the female, which was the larger of the two specimens. The only respect in which they are at all peculiar is in that of the hind foot, which, it will be observed, is as long as in the variety first described, notwithstanding the great difference in their general size. In fact this part was decidedly larger than in ordinary specimens of the same *entire* length. There was likewise in the recent animal a marked fulness about the head and snout, causing these parts also to appear larger than usual, although not to be inferred from the dimensions given in the table. Some of the other characters, as already stated, seemed to indicate immaturity. The points of the teeth were all sharp: the tail thick, and nearly round, the angles scarcely sensible; well clothed throughout its whole circumference with long hairs, and tipped with a fine pencil extending very nearly three lines beyond the bone. The colour of all the upper parts was bright chestnut, passing on the sides into ash-grey, which last colour pervaded also the parts beneath: tail and feet as well as the snout, light rufous.

In the male, the length of the head and body was 2 inc. $4\frac{1}{2}$ lines; that of the tail 1 inc. 9 lines; the rest of the proportions the same as in the other sex. The tail was equally stout, and more hairy, the pencil at the extremity extending still further beyond the bone. The colours on the whole similar, but the rufous tinge brighter and more distinct; the snout, feet, and tail, testaceous yellow.

I think it just possible that the variety last described *may* prove to be a distinct species, but I dare not consider it as such at present, and without inspecting more specimens from different localities. With regard to the first, as well as some others which I have seen, but which I do not think it necessary to dwell upon, I feel confident that they have no claim to be regarded in that light. I was, indeed, till lately strongly inclined to believe, like Mr Bell, that under the name of *common shrew*, we had in this country two or more species confounded. And possibly it may still be so. I can only say, that after the closest examination of every specimen of which I could get possession, I have failed in detecting any tangible characters upon which a specific difference could with certainty be established. If any such difference exist, it must be sought for in the number and form of the teeth, in the greater or less development of the auricle, in the breadth and size of the snout (compared in two individuals *of the same age*,) and perhaps in the size of the feet (similarly compared,) as well as in the presence or absence of *cilia* on these last; but *certainly not* in the absolute dimensions, nor in *all* the relative proportions, nor in the colour of the fur. As for the tail, neither its length, nor thickness, nor form, nor hairiness, afford characters of the slightest value.

I shall not conclude without earnestly soliciting from the readers of this Journal, any specimens of shrews which they may meet with in their own neighbourhood, but which they have not the leisure to examine themselves, or not the opportunity of comparing closely with others. Although I have been unsuccessful hitherto in the search after new British species of this genus, it is far from improbable that such remain to be discovered. There is no reason why we should not possess the *S. araneus* of Duvernoy, which it has been one of the objects of this paper to prove to be distinct from ours, nor the *S. fodiens* of the same author, equally distinct from the species so called by our own naturalists. It is, indeed, much to be suspected, that either this last, or some other aquatic species besides those with which we are well acquainted, has been already met with in this country, though not identified at the time of being observed. On comparing the descriptions, extant in different works,

of our *common water shrew*, it will be found that they do not agree in all particulars. Some of these variations may be due to accidental causes, or to differences of age or sex in the respective cases. Nevertheless, the circumstance is worth mentioning, as affording a stimulus to the researches of those naturalists who may be inclined to turn their attention to these animals. *

Reference to the Figures. Plate I.

In the annexed plate are given representations of the crania, and of portions of the upper and lower jaw, of the *S. araneus* and *fodiens* of Duvernoy, and of the similarly named species of British authors. The figures relating to the *continental* species are copied from Duvernoy's memoir, and are inserted for the purpose of comparison with our own.

The species are severally distinguished by the Roman numerals I. II. III. IV. as explained at the bottom of the plate. When these numerals are simple, the objects are represented of their natural size. When accompanied by a *dash* (I′. II′. &c.) they are to be considered as magnified to twice their natural size.

The Figures 1, 2, 3, 4, 5, indicate the numbers of the several kinds of teeth.

The letters refer to different views of the head, and jaws, and are the same for each species :

a. Is the cranium viewed from above.

b. The same viewed from beneath.

c. Is the anterior portion of *the same* viewed in profile.

d. Is a branch of the lower jaw, viewed externally.

e. The same viewed from within.

It should be mentioned that in the case of 1, *d* and *e* are those of a young individual.

f. Is intended to represent the mode of union of the two upper middle incisors as seen from the above, the occiput being turned towards the spectator.

*f**. Relates to *Var.* 1, of the *British araneus*, in which these incisors were worn down to their point of contact.

Swaffham Bulbeck,
Feb. 18, 1837.

* See in particular a notice in *Loud. Mag.* Vol. iii. p. 471, of a shrew taken near Liverpool, which the writer was unable to identify with either of our two well-known British species.

Postscript.—Since the above paper was written, I have had an opportunity (through the kindness of Mr Gray) of examining, in company with Mr Bell, the different specimens of British and Continental shrews preserved in the British Museum. The result was most satisfactory, being in exact accordance with what I had been led to believe from Duvernoy's memoir. In that collection, there are French specimens both of the *S. araneus* and the *S. Daubentonii* of foreign authors, and on closely comparing them with individuals of our own species, the differences in the teeth became immediately obvious.

London, Feb. 25, 1837.

III.—*Contributions to the Natural History of Ireland.* By William Thompson, Esq. Vice-President of the Belfast Natural History Society.

No. 2. *On the Birds of the Order Raptores.*

In the following paper it will be observed, that the catalogues of birds in the Statistical Surveys of Ireland are but rarely quoted, and, although it is my earnest desire to do justice to every one who has in any way contributed to a knowledge of the Natural History of the country, I am unwilling to bring forward species from the mere circumstance of their names appearing in a catalogue; indeed, in some instances where descriptions are given, from which the species can be identified, they have evidently been copied from authors, instead of being the result of an examination of actual specimens. The common English names, too, of species being misapplied, have led to errors, in consequence of the scientific appellation being appended as if they were correct: the county history, which contains the best and most ample catalogues of birds and fishes, bears evidence of this in both departments. Having thus far written in explanation, it must be added that I complain not of these catalogues, but consider that it would be most unreasonable to expect the many individuals who undertake writing in the statistics of a country, and who have not previously bestowed attention on natural history, to furnish us with zoological or botanical catalogues to satisfy the scientific naturalist.

Golden Eagle—*Aquila chrysaetos*, Vigors.—The collection of my friend, William Sinclaire, Esq. of Belfast, contains a splendid specimen in adult plumage of the golden eagle, which was trapped

a few years since on Muckish mountain, in the county of Donegal. The gamekeeper of Mr Stewart of "the Horn"* informed me when there in June 1832, accompanied by Richard Langtry, Esq. that since he entered on his present occupation in 1828, he had destroyed thirteen or fourteen eagles, one only of which was of this species —it was taken on one of the inland mountains of "the Horn." When about the same time I visited the precipitous mountain of Rosheen, near Dunfanaghy, in the same county, I was told that, previous to the last twelve years, a pair of eagles had their eyrie in one of the inaccessible cliffs, and, as their young advanced in growth, levied such contributions from the surrounding neighbourhood, that the country people finally resolved upon their destruction. This was effected by lowering from the summit of the precipice a lighted brand, which ignited and consumed the nest, and three unfortunate eaglets fell scorched and dead to the ground. The old birds from this time deserted the mountain. From the situation selected for this eyrie, the species was most probably the golden eagle.

On visiting Achil, off the coast of Mayo, in June 1834, in company with Robert Ball, Esq, of Dublin, Lieutenant Reynolds of the Preventive Service, a keen sportsman, and well acquainted with birds, assured us that one or two pairs of golden eagles breed annually in the island. When subsequently on the mountain of Croaghpatrick, that volcano-like terminates in a magnificent cone, and is in elevation the second in Connaught, we for a considerable time observed a pair of these eagles towering above its summit. In the county of Kerry a few weeks afterwards, an eagle, supposed to be of this species, was seen by some of our party when viewing the lakes of Killarney from the topmost ridge of Mangerton. When on a visit to this same place the previous autumn, my friend, Robert Patterson, Esq. of Belfast, made the following note, which he has kindly permitted me to use:—"Near to the little lake called the Devil's Punch-bowl, we disturbed four eagles preying on a full grown sheep; they rose majestically into the air as we approached. The people who were with us supposed the sheep, being perhaps sickly, had been killed by the eagles,—a supposition corroborated by the quantity of fleece scattered over the ground for some yards in one direction. The flesh of the neck was completely removed, although that of every other part was untouched. We were assured that two eagles will occasionally pursue a hare, one flying low and

* The name given to the peninsula bounding the western entrance to Sheephaven, in the county Donegal, and which terminates in the stupendous promontory of Horn Head.

coursing it along the ground, the other keeping perpendicularly above the terrified animal. When the lowest eagle tires, they change places, and pursue the same system of tactics, until the hare is completely wearied out. I was told the same circumstance a few days afterwards near Tralee, and again near Monasterevan : my informant in every instance stated the fact as having fallen under his own knowledge, and not as a matter of hearsay."

In October 1833, when looking over a collection of the British Falconidæ belonging to William Sinclaire, Esq., in company with Mr Adams, lately gamekeeper at Glenarm Castle, he at once recognized a golden eagle as the species of which he had killed four individuals in Glenarm Park (Antrim.) The first he saw was in the month of March, when two visited the park. At this time, there were but five lambs dropped, and on each of the two first two days of the eagles' appearance, two lambs were carried off, thus leaving only one. Mr Adams finding that lambs were in such request with these birds, procured two of them to bait his traps, and had thus the satisfaction of capturing both eagles. In November, a third individual made his appearance, and was seen by Mr Adams and several other persons in pursuit of a hare. This poor animal took refuge under every bush that presented itself, which, as often as she did, the eagle approached the bush so near as apparently to beat the top of it with his wings, and thereby forced the hare to leave her refuge. In this way she was eventually driven to open ground, which did not long avail, as the eagle soon came up with, and bore her off in his talons ; and so disappeared from the spectators. Mr Adams, hearing that this eagle had killed several of a neighbour's ducks, lost little time in obtaining one for his trap, and with this tempting bait secured him. The fourth eagle he came upon by chance when out shooting. This bird flew over him at about twenty yards distance, when he was fired at ; the shot from the first barrel bereft him of many feathers, but even after receiving the contents of the second, and though severely wounded, he was able to fly off. Mr Adams saw no more of him after this, until informed by some men who were near, that they had seen an eagle mobbed by magpies, and he was eventually discovered by the great number of these birds collected about the place where he lay dead on the heath with wings outstretched.

On Oct. 14, 1835, I saw an adult specimen of the golden eagle,* which was trapped the day before at Claggan (county Antrim.) It

* Now preserved in the Belfast Museum.

was accompanied by two others, which were also attempted to be taken, but unsuccessfully.

By Dr M'Donnell, and another elderly friend, both of whom well recollect the circumstance, I have been told that the same plan adopted by the Kerry peasant for supporting his family in a season of scarcity,* was successfully resorted to about thirty years ago at Glenariff, in the county Antrim. One of a pair of eaglets taken from a nest there, was so placed, that during the summer its parents supplied it with rabbits and hares in such abundance, that its owner obtained a sufficiency of animal food besides for himself and family. The old birds did not alight with their prey, but circling for some time above the eaglet, apparently until certain that the food would fall to the ground within its reach, then let it drop.

A sporting friend who was eye-witness to the fact, assures me that when out hunting among the Belfast mountains many years ago, an eagle, which from the darkness of its plumage he concluded was the golden, appeared above his hounds as they came to fault on the ascent to Devis, (the highest of the chain,) after a good chase. As they came on the scent again, and were at full cry, the eagle for a short time kept above them, but at length advanced, and carried off the hare when at the distance of from three to four hundred paces before the hounds.

In the two excellent works, "Gardens and Menageries of the Zoological Society," and "Illustrations of British Ornithology," the golden eagle is characterized as indocile: in the latter, Mr Selby speaks from his own experience of two individuals which were kept by him for some years. But my friend Richard Langtry, Esq. of Fortwilliam, near Belfast, has at present a bird of this species, which is extremely docile and tractable. It was taken last summer from a nest in Inverness-shire, and came into his possession about the end of September. This bird at once became attached to its owner, who, after having it about a month, ventured to give it liberty, a privilege which was not in the eagle's part abused, as it came to the lure whenever called. It not only permits itself to be handled in any way, but seems to derive pleasure from the application of the hand to its legs and plumage. This eagle was hooded after the manner of the hunting hawks for some time, but the practice was abandoned, and although it may yet be requisite if the bird be trained for the chase, hooding is otherwise unnecessary, as it remains quiet and contented for any length of time, and no matter

* Smith's Kerry. p. 97.

how far carried, on its master's arm. It is quite indifferent to the presence of any persons who may be in his company, and is unwilling to leave him even to take a flight, having to be thrown into the air whenever he wishes it to do so. When this eagle is at large, my friend has only to hold out his arm towards it, which, as soon as perceived, even from a distance, it flies to, and perches on. I have seen it thus come to him not less than a dozen times within half-an-hour, without any food being offered. It runs very fast. When on the ground, and the lure is thrown comparatively near, it prefers this mode of progression to using its wings. It is also fed from the "fist." Live rats have several times been turned out of the cage-trap to this bird, but before running very far, they were invariably pounced upon. Four full-grown rats have been taken at a meal; an entire Heron, (Ardea cinerea,) except the head and legs, was also eaten on one occasion. It differs somewhat in its manner of feeding from two sea eagles (Haliætus albicilla) which are kept along with it; when the head and neck of a goose is offered, the golden eagle eats them entire, the latter take the flesh off only, leaving the harder parts; and when entire birds are given, the sea eagle plucks many more feathers off than the golden; the latter assimilating to the peregrine falcon (Falco peregrinus) in this respect. This golden eagle is more partial to alighting on trees than the sea eagles, and stationed on their tops, keeps its master in view, following him about the demesne, and where plantations often intervene, flying from one to another in the direction he walks, indolently remaining as long as possible where it perches, consistently with keeping him in sight.

A golden eagle, also from Scotland, belonging to Mr William Sinclaire, is a much more familiar bird than a sea eagle in his possession, but being kept in town, its docility has not been put to the proof as in Mr Langtry's bird.

The golden eagle is generally represented as exceeding the sea eagle in magnitude, but such specimens of the latter as I have examined were invariably of superior size to the former, and I speak from comparison of adult individuals of the same sex.

Sea Eagle.—*Haliætus albicilla*, Selby.—The first Sea Eagle I had the satisfaction of seeing in Ireland was on the 25th of June 1832, when visiting the majestic promontory of Horn Head, which rises precipitously from the ocean to an elevation of nearly 600 feet. On looking over the cliff on the eastern side, one of these birds rose from a platform of rock about sixty yards distant. Immediately

after, on reaching the northern side, I perceived another sitting on her nest about a fourth of the way from the summit of the precipice; when she flew off, two eggs, greenish-white in colour, like those of the swan (Cygnus olor) were exposed to view. Very near to this was another nest at a similar distance from the top, but it was untenanted, and from its proximity to the other, I should rather suppose that both had belonged to the same pair of eagles in different years, than that they were occupied by two pairs at the same time. But less than a furlong distant to the eastward of the Head, there was a nest similarly situated, and containing two eaglets. To obtain these, we, on the 28th of June, engaged a man accustomed to the apparently hazardous exploit of descending precipices, and, a rope being attached to his body for safety, and a basket to his back for the reception of the eaglets, he was lowered to the nest, from which he brought up the birds without injury either to himself or them. The parents were most vociferous during the robbing of their eyrie, taking hurried flights, evidently in despair, towards the nest, but did not attack nor even closely approach the plunderer, nor did they come within fair gun-shot of the rock. The eaglets were almost entirely feathered. The first layer of this nest, as well as that of the other two, was composed of strong stems of heather; being unable to see the lining, I had it brought up, and found it to be the tender twigs of heath, and plants of the *Luzula sylvatica*, both of which grow on the summit of the cliff. About the nest there were many legs of rabbits and the remains of puffins (Mormon fratercula, Temm.)

On the following day I saw five sea eagles in mature plumage,* all that I understood were then at "the Horn." The bird we raised from the nest containing eggs, the gamekeeper thought had no partner, as he killed a male bird a few weeks before. At three of these eagles I gazed a long time, both when they were at rest and on wing; at first through a telescope, but permitting a much nearer approach than was anticipated, I had afterwards an excellent and near view of them. The head and neck in every position, and I looked attentively to this point, appeared almost as white as the tail,† and was so distinguished from a great distance, more espe-

* Excepting eaglets, the gamekeeper has never seen any but white-tailed or adult eagles here at this season.

† In the colour of the head and neck in preserved specimens of adult birds (having the tail pure white) which I have examined, there is considerable difference in this respect, and, though none has this portion of the plumage alto-

cially, when thrown into relief by a dark and rocky back ground. Several gulls (Larus canus?) and kestrels (Falco tinnunculus) kept flying closely after one of these birds, and occasionally approached so near as apparently to strike him, this a gull certainly once did, but "towering in his pride of place," the eagle never condescended to take even a momentary notice of them.

Under the head of Golden Eagle, it has been mentioned, that of the number thirteen or fourteen eagles killed at "the Horn" within four years,* all but one individual were the *Haliœtus albicilla*. I was informed by a gentleman resident at Dunfanaghy, the village nearest to Horn Head, that in winter the sea eagle is comparatively numerous, and that he has sometimes seen as many as six and seven in company on the strand.† They are supposed to be attracted hither at this season by rabbits, which greatly abound at "the Horn." In an article by John Vandeleur Stewart, Esq. on the Birds, &c. of Donegal, which appeared in the Magazine of Natural History for 1832, (p. 578,) the sea eagle is mentioned as resident and common. The author states that he had received three specimens for his museum, besides five living eaglets. Mr William Sinclaire, also, has a bird of this species from the same locality. In this county it likewise frequents Malin Head, the extreme northern point of Ireland.

When in June 1834, at Achil Head, which is fondly, but erroneously believed by the inhabitants of the island to approximate the shores of the western world, more nearly than any other European land, and stretching out afar into the Atlantic, is rendered sublime less from altitude, than from the utter barrenness of its desolate and inaccessible cliffs, a suitable accompaniment to the scene appeared in a sea eagle which rose startled from her nest on the ledge of an adjoining precipice. Two of these birds were seen by us the next day, soaring above a lake in the island, and we were informed by Lieutenant Reynolds, that four pairs of sea eagles breed in Achil. With respect to this species being in so wild a district comparatively fearless of man, it may be stated that on one occasion, when out

gether white, yet some are marked so faintly with very pale ash-grey, as to exhibit the appearance of soiled white, which, contrasted with the dark hue of the back and wings, gives from a distance the appearance thus described.

* The reward alone could hardly have prompted the destruction of this number,—one shilling a head only being given by the proprietor of "the Horn" for them.

† Temminck remarks that this species is common in winter on the shores of Denmark. "Man. d'Orn. de l'Eur." part 3, p. 27.

shooting in Achil, Lieut. Reynolds had with his first barrel shot a grouse, which an eagle stooped to carry of, and when just in the act of seizing was brought down by the second barrel. By Serjeant Croker of the Constabulary, a most intelligent man, we were assured that, about six months since, an eagle carried off a hen from the village of Ballycroy, when a few yards only distant from him and several other persons. He was told that a similar occurrence had several times before taken place.*

At Fairhead, the most lofty and sublime of the basaltic headlands of Antrim, this eagle has an eyrie:—in the same county it has been taken at Glenarm Park. In the Belfast mountains, far remote from any of its habitations, I was once (on October 2, 1832,) gratified by the sight of an eagle, which was soaring, attended first by one, and afterwards by a second kestrel. The snowy whiteness of the tail proved it to be an adult bird. It remained in view for about a quarter of an hour, then disappeared in the direction of the Cave-hill. In the deer park here, the last eagle I have heard of being taken near Belfast, was trapped upwards of twenty years ago.

When in August last, at Sleive Donard,† the chief of the Mourne mountains, in the county of Down, a cliff was pointed out as the "Eagle's rock," so named in consequence of having at one period been the eyrie of this bird. Our guide informed us, that eagles had not bred here of late years, (their place is supplied by ravens,) but that they annually build at less frequented places amongst these mountains. Here they are frequently met with by Lord Roden's gamekeeper, but are seldom seen so low down as Tollymore Park, where one only has been taken within the last nine years.

Montagu relates an instance of a sea eagle being so much wounded by a charge of snipe-shot, as, after flying some distance, to fall and be captured. I saw one which was similarly obtained at "the Horn," by Mr John Sims of Dunfanaghy, near to whom it rose as he was returning from snipe-shooting, when his gun was loaded only with this, the smallest of the sportsman's charges.

Of the two eagles taken from the nest at "the Horn," it may be stated, that Mr R. Langtry trained them so far, that they allowed him to carry them on his arm, and on giving them liberty in the morning, they flew about the demesne during the day, generally attend-

* When reading of this feat a short time before, in the "Wild Sports of the West," I looked upon it as an embellished tale.

† Montagu obtained specimens of the sea eagle from this mountain. The individual from which Pennant drew up his description was taken in Galway.

ed his call to the lure in the evening, when they were put up for the night, throughout which, however, they were occasionally at large. As food, they preferred rats to fish. When not very hungry, they, after tasting the blackbird (Turdus merula), showed a dislike to it, but that this did not arise from colour was further evident from black chickens being always as acceptable as others; gray crows (Corvus cornix) were also disliked, though magpies (Corvus pica) were favourite food.* On one occasion during rainy weather, they refused to eat for a few days, though at the same time they never retired to the shelter of their sheds, as buzzards (Buteo vulgaris), and peregrine falcons (Falco peregrinus), did which were kept along with them. One of these, a male, killed four pet birds, his constant companions in the same enclosure, † and which when he was tied ‡ either alighted near him, or were carelessly fastened within his reach; these were a white owl (which he devoured), a kite, a buzzard, and a peregrine falcon. This last bird, the eagle had partly plucked preparatory to eating, just as my friend appeared in view, when he instantly sprang from the falcon, the consciousness of his misdeed being further evinced, by his allowing it to be carried off, though any food given in the ordinary manner he would not permit to be removed. After having one of these birds about two, and the other four and a half years, they were both lost by flying to a distance, where they were shot. The latter assumed the white tail early in October 1836, then four and a half years old: it proved a male bird on dissection, and weighed 11 lbs.

Osprey—*Pandion haliætus*, Savigny.—The only occasion upon which I have seen the osprey in Ireland was when sailing on the lower lake of Killarney, on the 13th of July 1834, during which a single bird appeared for a short time in view, displayed its mode of fishing, and struck at some prey on the surface of the water.

* The peregrine falcon also shows distaste and partiality to birds nearly allied; thus the blackbird is disliked, whilst thrushes (Turdus musicus) are favourite food, and, though it will kill and eat the landrail (Crex pratensis) when hungry, it is averse to it, and has in some instances been observed to eject it from the stomach.

† Lieutenant Reynolds, once in Achil saw a pair of old sea-eagles attack a young bird of their own species, which they killed and eat, leaving only the bill and legs.

‡ When the Golden Eagle, Sea Eagle, Peregrine Falcon, Kite, Buzzard, and Kestrel, all of which Mr Langtry had at the same time, were at liberty, they never molested each other.

In the collection of Dr J. D. Marshall of Belfast, there is a fine specimen of the osprey, which was stated by the person of whom he bought it, to have been killed in Queen's county.

This species is mentioned by Mr Lingwood, as having been seen by him in August 1835, at Oughterard, county Galway.—Mag. Nat. Hist. Vol. ix. p. 128.

Jer Falcon—*Falco Islandicus*, Latham.—The following note appears under the head "Jer Falcon," in the MS. of the late John Templeton, Esq.—"In 1803, I received the skin of a bird of this species, which had been shot near Randalstown," (county, Antrim.) In a letter from John P. Stewart, Esq. dated Rockhill, Letterkenny, Feb. 3, 1837, it is mentioned that in his collection there is a jer falcon, which "was killed in a rabbit-warren close to Dunfanaghy, when on the wing." It is said to exhibit "the mature plumage of the male, (which sex it proved to be on dissection) as described by Temminck, the only point of difference being that my specimen has the bluish cere and tarsi of his young bird." The detailed description of the individual, kindly communicated to me by Mr Stewart, places the identity of its species beyond a doubt.

Peregrine Falcon—*Falco peregrinus*, Linnæus.—It may be stated in general terms, that the peregrine falcon occurs in suitable localities throughout Ireland. In the four maritime counties of Ulster it has many eyries,* and in Antrim, whose basaltic precipices are favourable for this purpose, seven at least might be enumerated—of these one only is inland; at the Gobbins, regularly frequented by a pair, there were two nests in one year within an extent of rock considerably less than a mile. This is the only instance known to me of so close an approximation on the part of the peregrine falcon. Even at "the Horn" in Donegal, where the extent of lofty precipices is very great and continuous, we met with but a pair of these birds, and were informed that they contain only one other eyrie.

On the two following occasions I had opportunities of remarking this falcon in haunts similar to those which, according to Wilson, it frequents in America. On the 8th of May 1832, as the banks of Belfast Bay,† at about a mile from the town on the northern shore,

* In rocks only have I known these in Ireland.

† Several species of the Raptores being mentioned as occurring in Belfast Bay, it should be stated that the tide recedes here to a very great distance, leaving a vast extent of banks uncovered, on many parts of which the grass-wrack (*Zostera marina*) grows so profusely as to impart a greenish tinge; the whole at low water presenting somewhat the appearance of a marsh.

were becoming bare from the ebbing of the tide, they were literally covered with dunlins (Tringa variabilis) and some ringed plovers (Charadrius hiaticula) intermixed, all busily feeding on the rejectamenta of the waves. This flock, consisting of many hundreds, to my surprise, suddenly, and without any apparent cause of alarm, took wing, but immediately afterwards I observed a peregrine falcon bearing down upon them. As they flew out to sea he followed them only a short way above the water, and returning without any prey, after a few bold and graceful sweeps, alighted on the beach they had left, when, with the aid of a pocket-telescope, I had the satisfaction of identifying his species with certainty. Again, on July the 13th 1833, when crossing the ferry near the junction of the river Bann with the ocean, I was attracted by the near call of a curlew, and on looking round, saw coming towards us what at first appeared to be two of these birds, flying close together just above the water. I was surprised to see the foremost dip in the river like a swallow, fly on a short way, and then alight in it, when the other bird, which proved to be a preregrine falcon, gave up the chase, and, flying past us, alighted on the beach at some distance. The curlew now finding it was safe, rose from the water, and flew back in the direction from which it had been pursued.

In the autumn and winter I have in Ireland met the preregrine falcon very far remote from any of its native rocks. In the south of Europe it is, according to Risso,* a bird of passage, appearing in the autumn and departing in the spring.

Some of our northern eyries have, for about the last twenty-five years, been in requisition annually to supply different sportsmen, but chiefly my friend, John Sinclaire, Esq. with falcons for the chase.† Woodcocks have always afforded the best flights with these birds, and in this exciting sport I have often witnessed that singular trait in their character, of leaving their quarry the moment it takes to cover.‡ In this way I recollect what promised to be a good chase, being at once terminated by the woodcock's descent close to a public road, and as it could not be again sprung, another had to be sought for. When returning home, however, about six hours after-

* Tom. iii. p. 26. ed. 1826.

† Mr Sinclaire tells me that, on going to obtain these hawks, he has frequently remarked the tercel or male bird circling at a great height in the air, from which he dropped his prey to the female as she kept flying about and screaming in the vicinity of the nest, to which she bore it.

‡ Mr Sinclaire's best falcon the first year pursued woodcocks into dense cover, so that it was difficult to get her out with safety to her plumage. This his falcons or female birds generally did the first year, but very rarely afterwards.

wards, a woodcock was raised from the base of a hedge at the road-side, where the bird had been lost in the morning, and was doubtless the same individual, as, unless pursued, such a place of refuge would never have been chosen. Here this bird had in all probability remained during the day, though many persons must have passed on the footway within a yard of it, but until this time it may not have recovered from its fright.

On one occasion, a woodcock, caught by a trained falcon of Mr Sinclaire's, was carried across a ravine, and a few minutes had elapsed before the falconer could come up with her, but even then, on disengaging the woodcock, it proved so little the worse as to afford a chase of average length to another falcon.* This is mentioned as an extraordinary instance, as is likewise the following. One of these hawks having caught a land-rail (Crex pratensis,) which it was about to eat on a house top, instantly gave chase to another rail that was sprung, and, still retaining its first victim, secured the second with its other foot, and bore both off together. †

In the winter of 1820–21, Mr Sinclaire lost a trained falcon, and knew nothing of her for some months, nor until a paragraph appeared in a Scotch newspaper, stating that a hawk, which had for some time frequented a rookery near Aberdeen, was killed, and on the bells attached to her, the name of "John Sinclaire, Belfast," was engraved. Another of this gentleman's falcons once left him, and took up her abode at a rookery about twelve miles distant from his place, and there remained for about six weeks, when she was again recaptured. When flown at rooks (Corvus frugilegus,) this bird always struck down several before alighting to prey on one. A person who was eye-witness to the fact assures me, that he once in Scotland saw a trained falcon similarly strike to the ground five partridges in succession out of a covey; but such occurrences are rare.

Mr Sinclaire, when once exercising his dogs on the Belfast mountains, towards the end of July, preparatory to grouse-shooting, saw them point, and on coming up he startled a male peregrine falcon

* The strike of this species is more fatal than its clutch.

† Upon one of the early days of February last (1837,) when this gentleman was hawking at some miles distance from his place, one of his falcons was lost in consequence of a heavy fog coming on, but she re-appeared in the hawk-yard a week afterwards; others of them have similarly returned after a much longer absence. The first flight of a falcon given by Mr Sinclaire to a gentleman resident about four miles off, returned to her old quarters, which she had been taken from six months before.

off a grouse (Tetrao Scoticus) just killed by him, and very near the same place he came upon the female bird, also on a grouse. Although my friend lifted both the dead birds, the hawks continued flying about, and on the remainder of the pack, which lay near, being sprung by the dogs, either three or four more grouse were struck down by them, and thus two and a half or three brace were obtained by means of these wild birds, being more than had ever been procured out of a pack of grouse by his trained falcons. *

In December 1832, one of these birds, which had her liberty at Mr Sinclaire's country place, was observed to fly several times over a pond on which a wild golden eye (Anas clangula), in the beautiful plumage of the adult male, had just alighted, and was remarked to keep watch on him during the day. At dusk, when wild fowl betake themselves to their feeding haunts, this golden eye departed from the pond, and was perceived by the falcon, which instantly commenced pursuit, and after a short chase, seized and brought him back to the place he had just left, when, by struggling violently, he became disengaged from her grasp, and took refuge in a small and shallow pond. Here again he was persecuted by two persons who had witnessed the above occurrence, and though his wings had not been in the least degree injured, he did not again venture to take flight, but seeking escape only by diving, was eventually captured, thus affording evidence of the feathered being more dreaded than the human tyrant. † He was now pinioned, and compelled to take up his abode with the other wildfowl in the aquatic menagerie, a place he had, in the unlimited freedom of flight, happened to visit but a few hours before.

In October 1833, a female peregrine falcon of Mr Sinclaire's, a bird of that year, and consequently but a few months old, got loose in the hawk yard, and killed a male of her own species a year or two older than herself, and which had the power of moving at least a yard from his block. She had him nearly eaten when a person entered the yard to feed them, which he did once daily at a regular hour. This female bird was "full fed" the day before, and had never got more than one meal in the day. Montagu relates a si-

* The same gentleman has frequently, when out shooting, obtained a single grouse, which had been thus killed by wild peregrine falcons, but never more, except in the above instance.

† Birds of all kinds, when put into cover, by peregrine falcons, generally allow themselves to be captured by the hand, rather than again venture on wing; even the black-cock (Tetrao tetrix) I have known to be thus taken.

milar occurrence in the Supplement to his "Ornithological Dictionary." About fifteen years ago, Captain Johnson of the 1st battalion of the Rifle Brigade, then stationed in the county Limerick, invited a large party, of which the fair sex as in the olden time formed a portion, to a day's hawking, but on going to the mew it was found that his peregrine falcon, having obtained her liberty, had killed and devoured a merlin (Falco æsalon) her partner in captivity. The misfortune on such an occasion was not only the loss of the merlin, but was twofold, as the feasting on it prevented the falcon's service in the chase for that day.*

Hobby—*Falco subbuteo,* Linnæus.—This bird is mentioned in the MS. of the late Mr Templeton, as having twice occurred to him in summer, in the mountains of Wicklow and Londonderry. It appears in Mr Stewart's published catalogue of the birds of Donegal, as an occasional but very rare visitant; this gentleman, however, in a letter to me dated Feb. 3, 1837, expresses doubt about it. The specimen alluded to in his catalogue is not preserved. I have never been able to obtain sight of an Irish Falco subbuteo.

Orange-legged Hobby—*Falco rufipes,* Bechstein.—To the following record of this species, communicated to the Zoological Society of London, on June 9, 1835, when the subject of it was exhibited, I have nothing further to add.

"An immature specimen of this bird, shot in the county of Wicklow, in the summer of 1832, forms part of the collection of T. W. Warren, Esq. of Dublin."—Zool. Proc. 1835, p. 78.

Merlin—*Falco æsalon,* Gmelin.—The merlin is indigenous both to the north and south of Ireland. For many years it has been known to me as breeding in the mountains of the county of Londonderry, whence I have in more than one summer seen nestlings, which were brought to William Sinclaire, Esq. These he in due time trained to the pursuit of larks and snipes. The intelligent gamekeeper at Tollymore Park informs me, that these birds breed regularly in the mountains of Mourne, (Down,) where in the summer of 1836, he had four of their nests. At Claggan, (Antrim,) I have also been told by com-

* As Pennant in treating of the *Lanner* remarks, "this species breeds in Ireland," and Bewick repeats the words without acknowledgment, it is perhaps requisite to state, that the true *Falco lanarius,* Linn. has never to my knowledge occurred in this country. The bird called Lanner by Pennant is now considered to be the peregrine falcon at a certain age.

petent authority, that the merlin has bred for the last few years. For the same purpose it is stated, by Mr Robert Davis, Junior, of Clonmel (Tipperary) to resort to the mountains in that neighbourhood, and Mr R. Ball informs me, that young merlins have been brought to him at Youghal, (Cork.) It can hardly be doubted that it similarly frequents many other mountainous parts of the country. The nests are said, by all who have seen them, to be invariably placed on the ground among the heath.

At the approach of winter, both the adult and immature merlins descend to the low grounds, where they sometimes remain until spring is far advanced. The earliest date at which in such places they have occurred to me * about Belfast, was the 3d of October, and the latest, the 17th of April.

On March the 9th 1832, when walking on the shore of Belfast Bay, as the tide was flowing, a merlin, which flew past me, was observed for some time coursing above the uncovered banks, the edge of the waves being the limit to his flight. This at once led me to believe he was in search of prey, which was confirmed by his giving chase to a large flock of dunlins (Tringa variabilis,) in pursuit of which he disappeared. From the oldest of the "shore-shooters" in Belfast Bay, I have heard that frequently, but chiefly in the autumn, he has seen hawks, which from his description were considered to be the merlin, follow and kill dunlins on the banks at low-water: this the above circumstance, witnessed by myself, tends to corroborate. I am not aware that the merlins thus resorting to the sea shore have been before noticed: the weather was mild in such instances.

The stomachs of several merlins I have examined contained the remains of birds alone.

Mr William Sinclaire has remarked to me, that when his merlins were given living prey, they instantaneously extinguished life, whether or not they at the time began feeding, whilst under similar circumstances, he has seen the peregrine falcon retain a bird in its grasp for some time, putting an end to its existence only when urged by hunger, though like the merlin, when it did commence, the most vital part was invariably the first "entered upon." His sparrow-hawks, it need hardly be added, began feeding indiscriminately on any part of the living objects offered them.

* On October 22d, I have seen it in the low grounds about Megarnie Castle, Perthshire.

The merlin is found in the south of Scotland during the whole winter.—Ed.

KESTREL—*Falco tinnunculus*, Linnæus.—This species is common and resident in Ireland, and is of more frequent occurrence in the north than any of the Falconidæ. It is met with about all our inland and marine cliffs, and builds within their fissures. Throughout the whole range of noble basaltic precipices in the north-east of Ireland, I have remarked its presence. In trees, church towers,* &c. it also builds with us. The kestrel has been so far trained by Mr William Sinclaire as, when given its liberty, to attend and soar above him like the peregrine falcon, and fly at small birds let off from the hand. One of these hawks, which was kept by this gentleman in the town of Belfast, had its freedom, and flew every evening to roost in an extensive plantation in the country, about a mile distant, in flying to and from which it was at first recognized by the sound of the bells attached to its legs. This bird returned regularly to its town domicile at an early hour in the morning.

Mr R. Langtry has often seen a wild kestrel rise from the enclosure in which his eagles, &c. are kept, but never having observed it to carry away any food, knows not whether this, or curiosity (which we often see displayed by birds,) may have been the object of its visit.

Often as I have seen the swallows follow in the train of birds of prey, I never but in the following instance saw one of them become the pursued. On September the 22d 1832, when walking with a friend in the garden at Wolfhill, near Belfast, a male kestrel, in close pursuit of a swallow (Hirundo rustica) appeared in sight over the hedge-row, and continuing the chase with extreme ferocity, lost not the least way by the swallow's turnings, but kept within about a foot of it all the time, at one moment passing within five or six yards of our heads. It is idle to conjecture how long the foray may have lasted before we witnessed it, but immediately on the kestrel's giving up the chase, the swallow, nothing daunted, became again, accompanied by many of its species, its pursuer and tormentor, and so continued until they all disappeared. The kestrel was probably forced to this chase by the particular annoyance of the swallows, they and the martins, (Hirundo urbica,) being more numerous this day at Wolfhill, than they had been at any time during the season.

(To be continued.)

* The only place of this kind in the vicinity of Belfast that I know to be selected for the purpose is the tower of Ballylesson church, which, of the many edifices of this description in our populous neighbourhood, is the only one which contains a set of musical bells.

IV.—*Cheloniorum Tabula Analytica.* Auctore Carolo L. Bonaparte, Muxiniani Princip.

Qui primus forte omnium ostenderam posse Testudines, *Testudinina* a me ipso appellatas, majori proprietate distingui, non intuitu articulationis amplius testarum, sed potius connexionis ; intereaque nonnulla tunc mihi perspicua genera definivi, ac caetera omnino statuenda fore praefatus sum ; nunc integrum Cheloniorum ordinem complecti quasi ex contractu debere, et quae descripseram confirmare, et quidquid recentiores Erpetologi de Testudinibus tradunt colligere judico. Nemo vero sanus opellam hanc meam alienis veluti flosculis simpliciter intertextam reprehendet ; cum enim hic Reptilium stipes in Galliis non minus quam in Britannia ac Germania celebretur adeo, ut viri doctissimi Grayus, Bellus, Waglerus, Dumerilus cum Bibrono, et Fitzingerus praecipue sedulam illi operam navent ; nefas mihi foret ab eorum sapientia desciscere, eorumdem imo doctrinas non consectari. Idcirco diurna nocturnaque manu illorum scripta versando non pauca decerpsi characterum rudimenta ad genera melius singulatim decernenda omnia ; quamobrem vocabula etiam nonnulla quae sapientes illi protulere de suo, non casu aliquo sed libens volensque dedita opera arripui quoties uni eidemque rei significandae inservirent. Cui properando operi tabellam tantum de more analyticam sine ullo verborum apparatu ad usum literariarum ephemeridum maturavi.

Dabam Romae prid. Id. Majas MDCCCXXXVI.

Carolus L. Bonaparte, Muxiniani Princeps.

CHELONII (Testudines, Wagl.) sunt *Reptilia* corpore inverso, testeo ; cute fornici dorsali et sterno adstricta ; tetrapoda, edentula.

Conspectus Familiarum et Subfamiliarum.

I. TESTUDINIDAE. (Testudinidae, Emydae, Chelydae, Gray. Chersites, Elodites, Dum. Tylopoda, Steganopoda rostrata, Steganopoda mandibulata, Fitz.) Pedes ambulatorii, longitudine pares. Thorax scutis corneis tectus. Labia nulla.

1. Testudinina. (Testudinidae, Bell. Chersites, Dum. Tylopoda, Fitz.) Pedes digitigradi, clavati, digitis indistinctis. Os corneum. Collum retractile. Pelvis mobilis.
2. Emydina. (Emydae, Gray. Elodites cryptodéres, Dum. Steganopoda rostrata, *part.* Fitz.) Pedes plantigradi, digitis distinctis, plerumque palmatis. Os corneum. Collum retractile. Pelvis mobilis.

3. Hydraspidina. (Chelydae, *part.* Gray. Elodites pleurodéres, *part.* Dum. Steganopoda rostrata, *part.* Fitz.) Pedes plantigradi, digitis distinctis, palmatis. Os corneum. Collum versatile. Pelvis immobilis.
4. Chelina. (Chelydae, *part.* Gray. Elodites pleurodéres, *part.* Dum. Steganopoda mandibulata, Fitz.) Pedes plantigradi, digitis distinctis, palmatis. Os coriaceum. Collum versatile. Pelvis immobilis.

II. TRIONYCIDAE. (Trionycidae, Gray. Potamites, Dum. Steganopoda labiata, Fitz.) Pedes ambulatorii, longitudine pares. Thorax corio laevi indutus. Labia carnosa.

5. Trionycina. (Trionycidae, Gr. Potamites, Dum. Steganopoda labiata, Fitz.) Pedes plantigradi, digitis distinctis, palmatis. Os corneum. Collum versatile. Pelvis immobilis.

III. CHELONIDAE. (Chelonidae, Gray. Thalassites, Dum. Oiacopoda, Fitz.) Pedes natatorii, compressi, longitudine inaequales, digitis indistinctis. Labia nulla.

6. Chelonina. (Chelonidae, Bell.) Thorax scutis corneis tectus.
7. Sphargidina. (Sphargidae, Bell.) Thorax corio verrucoso indutus.

Conspectus Generum et Subgenerum.

FAMILIA I. TESTUDINIDAE.

subfamilia 1. testudinina.

1. Testudo, Dum. (*Chersine*, Merr.) Metathorax inarticulatus: sternum antice inarticulatum: pedes pentadactyli.
   1. Chersus, Wagl. Sternum postice articulatum. *Testudo marginata*, Schoepf. Eur. As. Afr. 2.
   2. Testudo, Wagl. Sternum inarticulatum, scutis duodecim.
      1. Testudo, Fitz. Scutellum nuchale: scutellum caudale bipartitum. *Testudo graeca*, Linn. Eur. m. As. 3.
      2. Psammobates, Fitz. Scutellum nuchale: scutellum caudale integrum. *Testudo polyphemus*, Daud. Afr. Am. s. 4.
      3. Geochelone, Fitz. Sine scutello nuchali: testa margine laterali angulata. *Testudo stellata*, Schweigg. As. Afr. Am. m. 6.
      4. Chelonoidis, Fitz. Sine scutello nuchali: testa margine laterali rotundata. *Testudo tabulata*, Walb. Am. m. 3.
   3. Chersina, Gray, Sternum inarticulatum scutis undecim.

1. Cylindraspis, Fitz. Sine scutello nuchali.
Testudo Vosmaeri, Fitz. Afr. m. 3.
2. Chersina, Fitz. Scutellum nuchale.
Testudo angulata, Dum. Afr. m. 1.

2. Homopus, Dum. Metathorax inarticulatus: sternum inarticulatum: pedes tetradactyli.
Testudo areolata, Thumb. Afr. m. 2.

3. Pyxis, Bell. Metathorax inarticulatus: sternum antice inarticulatum.
Pyxis arachnoides, Bell. As. m. Oc. 1.

4. Kinyxis, Bell. (*Cinixys*, Wagl.) Metathorax postice articulatus.
1. Cinothorax, Fitz. Scutella marginali cum nuchali viginti quatuor.
Kinixys Homeana, Bell. Am. m. 2.
2. Cinixys, Fitz. Scutella marginalia sine nuchali viginti tria.
Testudo erosa, Schweigg. Am. m. 1.

SUBFAMILIA 2. EMYDINA.

§ GULA SINE PAPILLIS.

5. Cistudo, Nob. (*Terrapene* part. Bell. *Cistudes clausiles*, Dum. *Pyxidemis*, Fitz.) Sternum metathoraci ligamentis adnexum ope scutorum abdominalium: sine scutellis axillaribus et inguinalibus: testa gibba binis valvis sternalibus undique obserabilis.
Testudo clausa, Linn. Am. s. Oc. 3.

6. Emys, Nob. (*Cistudes baillantes*, Dum.) Sternum metathoraci ligamentis adnexum ope scutorum pectoralium atque abdominalium: scutellis axillaribus et inguinalibus: testa depressa non obserabilis.
1. Emys, Wagl. Sternum articulatum.
Testudo lutaria, Linn. Eur. As. Afr. 2.
2. Cyclemys, Bell. Sternum inarticulatum.
Cistudo Diardi, Dum. As. m. 1.

7. Terrapene, Nob. (*Emys*, Dum. *Clemmys*, Wagl.) Sternum metathoraci per symphysin affixum, inarticulatum; scutis sterno-costalibus duobus discretis non interjectis: digiti palmati: ungues anteriorum pedum quinque, posteriorum quatuor: cauda gracilis.
1. Clemmys, Fitz. Nasus prominulus.
T. lutaria, Schweigg. nec Linn. (*Sigriz*, Mich.) Eur. As. Am. Oc. 36.
2. Rhinoclemmys, Fitz. Nasus protractus.
T. verrucosa, Walb. Am. m. 2.

8. Geoemys, Gray. (*Emys*, part. Dum. *Clemmys*, part. Fitz.) Sternum metathoraci per symphysin affixum, inarticulatum:

digiti fissi: ungues anteriorum pedum quinque, posteriorum quatuor: cauda gracilis.

Emys Spengleri, Schweigg. Afr. 1.

9. Tetraonyx, Less. Sternum metathoraci per symphysin affixum, inarticulatum: digiti palmati: ungues undique quatuor: cauda gracilis.

Tetraonyx longicollis, Less. (*Emys Batagur*, Hardw.) As. or. 2.

10. Platisternon, Gray. Sternum metathoraci per symphysin affixum, inarticulatum, latissimum: scutis sterno-costalibus tribus: digiti palmati: ungues anteriorum pedum quinque, posteriorum quatuor: cauda grandis et longa.

Platysternon megacephalum, Gray. As. or. 2.

§ §. gula cum papillis.

11. Chelydra, Schweigg. (*Chelonura*, Flem. *Rapara*, Gray. *Saurochelys*, Latr. *Emysaurus*, Dum.) Sternum metathoraci per synchondrosin affixum ope scutorum abdominalium, inarticulatum, angustum: scutis sterno-costalibus tribus, uno tantum interposito: scutella marginalia viginti quinque: scuta sterni duodecim: cauda grandis et longa, cristata.

T. serpentina, Linn. Am. s. 1.

12. Staurotypus, Wagl. (*Sternotherus*, part. Bell.) Sternum metathoraci per symphysin ope scutorum pectoralium abdominaliumque affixum, angustum, antice articulatum: scutis sterno-costalibus duobus contiguis interpositis: scutella marginalia vigintitria: scuta sterni octo: cauda brevis.

Terrapene triporcata, Wiegm. Am. s. 1.

13. Kinosternum, Nob. (*Cinosternum et Staurotypus*, part. Dum.) Sternum metathoraci per symphysin ope scuti abdominalis affixum, articulatum; scutis sterno-costalibus duobus contiguis interpositis: scutella marginalia vigintitria: scuta sterni undecim: cauda brevissima.

1. Sternotherus, Fitz. (*Staurotypus*, part. Dum.) Sternum angustum, antice articulatum.

Testudo odorata, Daud. Am. s. 1.

2. Cinosternon, Wagl. Sternum latum, antice et postice articulatum.

Testudo pensylvanica, Gm. Am. s. 5.

subfamilia 3. hydraspidina.

§. caput depressiusculum; oculi laterales.

14. Peltocephalus, Dum. (*Podocnemys*, Fitz. part.) Caput scutellatum, grande: mandibulae incurvae: sine scutello nuchali: pedes parum palmati: cauda unguiculata.

Emys tracaxa et *macrocephala*, Spix. Am. m. 1.

15. Podocnemys, Wagl. Caput scutellatum, superne sulcatum: sine scutello nuchali; mandibulae rectiusculae: pedes late palmati: cauda mutica.

Emys expansa, Schweigg. Am. m. 2.

16. Emydura, Nob. (*Platemys* part. Dum.) Caput corio tectum: scutellum nuchale.

Emys Macquaria, Cuv. Oc. 1.

§§ caput depressum: oculi superi.

† gula cum papillis.

17. Pelomedusa, Wagl. (*Pentonyx*, Dum.) Ungues undique quinque: sternum inarticulatum.

Testudo galeata, Schoepf. Afr. 2.

18. Pelusios, Wagl. (*Sternotherus*, Gray. Dum.) Ungues pedum anteriorum quinque, posteriorum quatuor: sternum articulatum.

Testudo subnigra, Lacep. Madag. 5.

19. Hydraspis, Gray, (*Platemys*, Dum.) Ungues pedum anteriorum quinque, posteriorum quatuor: sternum inarticulatum.

1. Platemys, Wagl. Caput scutellis tectum: nasus prominulus: pedes scutellis contiguis. *Testudo planiceps*, Schn. Am. m. 6.
2. Rhinemys, Wagl. Caput scutellis tectum: nasus productus: pedes scutellis contiguis. *Emys nasuta*, Schweigg. Am. m. 4.
3. Phrynops, Wagl. Caput corio tectum: nasus prominulus: pedes scutellis discretis. *Emys Geoffroana*, Schweigg. Am. m. 2.

†† gula sine papillis.

20. Chelodina, Dum. (*Hydraspis*, Fitz.) Ungues undique quatuor.

1. Chelodina, Bell. Scutellum nuchale scutellis collaribus interpositum. *Testudo longicollis*, Shaw. Oc. 1.
2. Hydromedusa, Wagl. Scutellum nuchale scuto vertebrali primo et scutellis collaribus interpositum.

Emys Maximiliani, Mikan. Am. m. 2.

subfamilia 4. chelina.

21. Chelys, Dum. (*Matamata*, Merr.)

Testudo fimbria, Gm. Am. m. 1.

FAMILIA II. TRIONYCIDAE.

subfamilia 5. trionycina.

22. Amyda, Schweigg. (*Aspidonectes*, Wagl. *Trionyx*, Gray. Bell. *Gymnopus*, Dum.) Testa margine cartilagineo: sternum angustum: pedes non retractiles.

† Ossa costalia postica contigua.

1. Aspidonectes, Fitz. Os cervicale vertebralibus conjunctum, in tota superficie rugosum. *Trionyx Ægyptiacus*, Geoffr. As. Afr. 4.

2. Platypeltis, Fitz. Os cervicale vertebralibus conjunctum, in medio tantum rugosum. *Testudo ferox*, Gm. Am. s. 2.
3. Pelodiscus, Fitz. Os cervicale a vertebralibus separatum, in medio tantum rugosum. *Aspidonectes Sinensis*, Weigm. As. or. 1.

† † Ossa costalia postica interpositis vertebralibus discreta.

4. Amyda, Fitz. Os cervicale a vertebralibus separatum, in medio tantum rugosum. *Trionyx subplanus*, Geoffr. As. m. 2.

23. Trionyx, Wagl. (*Æmyda*, Gray. Bell. *Cryptopus*, Dum.) Testa ossiculis marginalibus aucta: sternum latum, lateribus valvis munitum: pedes retractiles.

Testudo granosa, Schoepf. As. m. Afr. 2.

FAMILIA III. CHELONIDAE.

SUBFAMILIA 6. CHELONINA.

24. Chelonia, Brongn. (*Caretta*, Merr.) Sternum latum, scutis tredecim scutello intergulari, ope scutorum humeralium, pectoralium, abdominalium et femoralium metathoraci affixum: scuta disci tredecim.

1. Chelonia, Nob. (*Chélonées franches*, Dum.) Scuta disci postposita: nasus prominulus: mandibulae denticulatae: gnatotheca tribus partibus constans. *Testudo mydas*, Linn. Atl. Pac. 3.
2. Caretta, Nob. (*Chelonées imbriquées*, Dum.) Scuta disci imbricata: nasus productus: mandibulae integrae: gnatotheca individua. *Testudo imbricata*, Linn. Atl. Pac. 1.

25. Thalassochelys, Fitz. (*Chelonées Caouanes*, Dum.) Sternum angustum, scutis duodecim sine scutello intergulari, ope scutorum pectoralium, abdominalium et femoralium metathoraci affixum: scuta disci quindecim.

Testudo caretta, Linn. Med. Atl. Pac. 1.

SUBFAMILIA 7. SPHARGIDINA.

26. Sphargis, Merr. (*Coriudo*, Flem. *Dermochelys*, Blainv. *Scytina*, Wagl. *Dermatochelys*, Fitz.)

Testudo coriacea, Linn. Med. Atl. Pac. 1.

V.—*Miscellanea Zoologica.* By George Johnston, M. D. Fellow of the Royal College of Surgeons of Edinburgh. Plates II. III.

III.—The British Ariciadæ.

The Annelides, say MM. Audouin and Milne-Edwards,* which we group round the genus *Aricia* of Savigny, and of which we form the fifth family in the order Errantes, present very considerable dissimilarities in their external structure,—a circumstance

* Ann. des Sciences Nat. Vol. xxix. p. 388.

which ought not to surprise us, for whenever organs, because of their minor developement, become of slight importance in the economy of the animal, and are about to be obliterated more or less entirely from its anatomy, we find them to vary proportionably in their forms. Such is the case with the exterior appendages of the Ariciadæ, a small family which intervenes to smooth the abruptness of the passage between the more typical An. Errantes, and the Annelides of the orders Terricolæ and Tubicolæ.

It is probably from this discrepancy among them that, up to this time, no naturalist has seized upon the characters which seem to us to unite them in one, but every one has scattered its members among different groups. Several of them have been considered as related to the Earth-worms, others to the Nereides, and a certain number have been collected together by M. de Blainville in his family "Nereiscoles." The end which that zoologist had in view in the establishment of that family is very nearly the same which has led us to unite in one distinct group the Annelides in question; and it is probable that if Blainville had personally observed a greater number of species, his opinions relative to the *composition of the family* would have been more in unison with ours than they happen to be.*

The Ariciadæ have in general the elongated linear form of the Nereides and Euniciadæ, but their body is not truncated in front as in these Annelides, rather diminishing, on the contrary, in thickness at the cephalic extremity. It is nearly cylindrical, and is composed of a very considerable number of narrow segments. The head is small,—often not to be distinguished from the superior lip, and it is not distinctly separated from the body. The antennæ are in general obsolete, but in some of the genera more than usually developed; while the eyes are either wanting or very minute. The proboscis is very short, and does not perceptibly exceed the cephalic segment: it is rather membranous than fleshy, and is never furnished with jaws, but sometimes we observe tentacula in it. The anterior rings of the body are narrow, and have always ambulatory feet, which, in general, are slightly prominent, and divided into two

* A great number of the *Nereiscoles* of M. de Blainville are only imperfectly known by the descriptions of Muller, Otho Fabricius, &c. and ought, in the opinion of Audouin and M. Edwards, to be referred to the *Euniciadæ*; while in the works of these authors the Annelides, with a few exceptions, which constitute the present family, are not to be found, and could not take a place among the *Nereiscoles*, if regard were to be had to Blainville's character of it. Hence Audouin and M. Edwards have found a new designation necessary to prevent confusion.

branches, and in no instance replaced by tentacular cirri. The bristles with which they are garnished are too weak to be of much use as defensive organs. In most of the genera all the feet are similar on all the rings, but in some we find those of the anterior portion of the body to differ from the succeeding ones, and of which the ventral branch at least resembles those feet with crotchets which we meet with so constantly in the order Tubicolæ. The soft appendages are subject to much variety in the Ariciadæ. The cirri never fail at least on one of the branches of the foot, but commonly we do not find them on both; they have sometimes the form of fleshy filaments, more or less delicate, at other times they constitute flattened tonguelets. Branchiæ properly so called are in general defective; sometimes, however, they exist under the form of well-developed lobules fixed to the feet, and in other cases they consist in a certain number of tentacular filaments, similar to the cirri, and fixed upon the dorsal arch of some of the rings of the anterior part of the body,—a disposition of parts which evidently leads us to that more peculiarly characteristic of the *Annelides tubicolæ*.

The character of the family may be summed up as follows:

*Feet slightly prominent in general and of little complexness of structure, sometimes alike throughout, sometimes dissimilar in different parts of the body, but never alternately furnished with, and destitute of certain soft appendages: Branchiæ none or very simple: Head rudimentary: Antennæ and eyes frequently wanting: no Jaws: Proboscis very short and indistinct: no Tentacular cirri: In general a single cirrus to each foot, and when a second exists, this is rudimentary.**

Of the four genera which Audouin and Milne-Edwards include in this family, we have two native species of one only; but it is remarkable that our other species, which as yet are limited to the number of three, constitute two new genera in it very distinct from any hitherto characterized. The fact is an additional illustration of an axiom in natural history,—that all aberrant and osculant groups are not only comparatively few in species, but at the same time these species are so dissimilar among themselves that each, or every two or three of them, will be found to have characters which are properly generical.

It may be useful to give the characters of all the genera hitherto proposed, for as the British species are probably more numerous than has been ascertained, so it is not unprobable we may have a representative of each genus.

* Translated, but not always closely, from Audouin and M.-Edwards, ut sup. cit.

* *Feet of two kinds, dissimilar.*

I. Aricia. *Feet* raised upon the back, those of the anterior part of the body composed of two very dissimilar branches, the ventral branch having some analogy to the feet with crotchets,—the other feet with two branches nearly alike: *Head* conical: *Antennæ* none or rudimentary: No *oral Tentacula.*

II. Leucodore. *Feet* papillary and setigerous, the first four pairs abranchial, the fifth with crotchets; the following like the anterior, but with a cirrus reflected on the back, and becoming branchial: *Head* conical: *Antennæ* two, occipital, setaceous: *Proboscis* none.

** *Feet co-ordinate, and alike.*

III. Nerine. *Head* small but distinct, furnished with two long occipital *antennæ:* no oral *tentacula: Feet* biramous, each branch consisting of a membranous lobe and a short setigerous pedicle: *Branchiæ* forming a series of short setaceous filaments along each side reflected on the back, with a small *cirrus* at their base.

IV. Aonia. *Head* small but distinct, surmounted with a conical very short *antenna:* no *oral tentacula: Feet* divided into two branches each garnished with a lamellar lobe: a dorsal but no ventral *cirrus:* no *branchiæ.*

V. Ophelia. *Head* indistinct, terminated by two large tentacular *horns,* surmounting a circle of *oral tentacula: Feet* with two branches scarcely protruding, and without membranous lobes: no dorsal *cirrus:* a ventral *cirrus* upon the rings of the middle part of the body.

VI. Cirratulus. *Head* conical indistinct, and destitute of all soft appendages: *Feet* scarcely projecting, with two branches widely separate: no ventral *cirrus*: the dorsal *cirri* filiform and very long: in general *branchiæ* exactly similar to the cirri and fixed upon the back of one of the rings of the anterior part of the body.

II.—Leucodore, * Johnston.

Character.—*Body vermiform: head conical: mouth simple, emandibulate: eyes four: antennæ* 2, *occipital, large, long, and setaceous, ciliated: four anterior segments with papillous setigerous feet,*

* Name from λευκος white, and δωρ a gift: The naturalist who has experienced the joys of finding a hitherto unseen animal, and to whom the pleasing duty has been reserved of publishing an additional illustration of the wisdom of his

the fifth with crotchets, the rest with papillous feet like the anterior segments, but furnished besides with a branchial cirrus reflected on the back: anal segment campanulate, the anus opening in its concave centre.

L. Ciliatus. Plate III. Fig. 1–6.

Hab. In crevices of slaty rocks near low-water mark. In Berwick Bay.

Description.—Worm from 6 to 8 lines long, linear-elongate, or slightly tapered to the tail, somewhat quadrangular, of a yellowish or flesh colour, with a dark red line down the middle. Head small, depressed, in the form of a short cylindrical proboscis, encircled with a raised hood or membrane; mouth edentulous; eyes 4, minute, placed in a square at the base of the antennæ, which are more than a fifth of the length of the body, tapered, wrinkled, and clothed along their inferior sides with short cilia. Segments numerous, narrow, distinct, the first four with an inferior papillary cirrus on each side, and a brush of retractile bristles; the fifth with a series of bristles curved like an italic *f*, obtuse, not capable apparently of being protruded like the others, and having rather a more ventral position; the following segments have on each side an obtuse branchial cirrus originating from the dorsal margin, as long as half the diameter of the body, held either erect, or reflected across the back to meet its fellow on the mesial line, beneath it a small mammillary foot, armed with five or six sharp slightly curved bristles of unequal lengths, under this a bundle of much smaller bristles (crotchets?) with a small conical cirrus with a still more ventral position. The branchial cirrus is clothed on its lower aspect with rather long moveable cilia; it becomes very small or entirely disappears on the posterior segments, in which the bristles on the contrary appear to be longer and more developed; bristles simple, unjointed; anal segment conformed into a circular cup or sucker, in the centre of which the anus opens by a small round aperture.

In this worm the cilia which cover the under sides of the branchial processes are remarkable for their size and length, for they can be seen with a common magnifier fanning the water with equal and rapid beats, and driving the current along their surface. Their analogy with the cilia of zoophytes is obvious, but here their motion

Creator, and of filling up a blank in our knowledge of His works, will at once divine the origin of this name so strangely applied to a worm.

"Nomen habes niveis nunc inscriptum ergo lapillis."

The scholar may remember that the name was originally formed by some classical wit for Dr Whitgift, the famous Archbishop of Canterbury, temp. reg. Elizab.—See Walton's Lives by Zouch, p. 209. York, 1807.

is certainly dependant on the will of the animal, for I have repeatedly seen it begin and stop, and be again renewed after an interval of repose, and again be checked in a manner that could leave no doubt but that the play of the organs was entirely voluntary. The cilia of the antennæ, notwithstanding the larger size of the organs, are less than half the length of those of the branchiæ.

Leucodore ciliatus lives between the seams of slaty rocks near low-water mark, burrowing in the fine soft mud which lines the fissures. Its motions are slow. When placed in a saucer it keeps itself rolled up in an imperfectly circular manner, lying upon its side, and the painful efforts made to change its position, and with little or no success, shew too plainly that it is not organized to creep about like the Annelides errantes, but on the contrary that its proper habitat must be a furrow similar to those of the Tubicolous worms, to which, in structure, it evidently approximates in several particulars.

Plate III. Fig. 1. Leucodore ciliatus of the natural size. 2. The same magnified. 3. An antenna more highly magnified. 4. The bristles of the fifth segment. 5. A branchial process separated to shew the cilia. 6. A few of the oviform bodies which lie between the intestine and skin.

III. Nerine,* Johnston.

Character.—*Body vermiform, subquadrangular: head small, distinct: mouth sub-inferior, with a very short edentulous proboscis: eyes minute: antennæ two, occipital, large, long, tapered: branchiæ forming an uninterrupted series of short tapered ciliated filaments along each side reflected on the back, with a lobe at their base: feet all alike, well developed, biramous, each branch consisting of a compressed lobe and a short pedicle armed with simple bristles: anus stellated.*

Observations.—The body of the Nerines is elongated and vermiform, narrowed a little at the head, and tapered gradually towards the anal extremity. It is somewhat quadrangular, and is formed of numerous narrow segments. Each segment has on each side, affixed to its dorsal margin, a subulate branchial process, as long as the semidiameter of the animal, and of a fine red colour, which proceeds from two large blood-vessels running up within it. A cuticular fold or membrane invests the base of each branchial filament, and mounts along the side to an extent which varies with its position; for on the filaments of the anterior third of the body

* Nērīnē, a patronymic of the daughters of Nereus.

the membrane rises to the very apex and is comparatively broad, but posterior to this the point of the filament is free, and still further back the membrane gradually shortens until it at length is no longer to be traced,—the branchiæ at the same time becoming gradually less, and ultimately obsolete on the caudal segments. (Pl. II. fig. 12, 5, 6, 13.) When in water the branchiæ are raised and extended, and in almost constant movement; but when the worm is removed from the water, they are laid across the back, their points meeting in the middle, and give the body the appearance of being marked with transverse folds or elevated striæ. They are fringed on both margins with a single series of vibratile cilia, discoverable with a magnifier of common powers, but these cilia are deficient on the apex, as well as on the lobe, while they extend over the dorsal arch of the segments. (Fig. 3.) The head is furnished with two large slightly tapering antennæ which originate from the occiput, and which are often cast off in the struggles of the animal: they consist of two large central vessels filled with red blood, and coated with a white mucous skin which, when magnified, appears roughish or crenulate, and one side has a row of minute cilia, not, however, to be seen except with a good glass. The antennæ can be directed to any point, and are capable of being rolled up in a spiral form. (Pl. II. Fig. 11.) There is a good deal of complexity in the structure of the feet, which renders their description and delineation difficult: they are lateral, and deeply divided into a dorsal and ventral branch, which is compressed, and armed with a series of retractile bristles of unequal lengths, and to each branch there is affixed a rounded plain compressed lobe, probably a modification of the cirrus of other annelides. The bristles are simple, curved, and acutely pointed, those of the dorsal branch longer than those of the ventral, and there is a small fascicle of longer ones at the root of the branchial filament. (Fig. 3.) The feet are apparently alike along each side until within a few segments of the tail, when the branchial filaments become very short or disappear, and the ventral branch seems to acquire a superior developement, and to be armed also with longer bristles. (Fig. 4.) The anus is dorsal in its aspect, and is surrounded with eight short equal papillæ, which assume a star-like form when the aperture is dilated.

The Nerines inhabit the sea shore, and the margins of our river, a little below high-water mark. They prefer a soil composed of sand and mud, and in which the latter rather preponderates. They are found lurking under stones, or burrowing in the soil, and in the latter situations, the surface to a great extent is seen full of small

round perforations, and covered with little heaps of its tubular and spiral excrements. When disturbed, they descend in their furrows with great rapidity, and to a considerable depth; when taken they throw themselves into violent contortions, as they "were waxed mad," during which the body generally separates into several portions, or loses its antennæ, which always separate at their very base. Their several portions retain their vitality for at least some days, which they evince not merely by their contortions when pricked, but even by moving from one place to another. The animals are named "Rag worms" by our fishermen, and are used in this neighbourhood as bait to take the fry of the coal-fish.

This genus is evidently very different from any characterized by Audouin and Milne-Edwards. I have seen two species, of which the characters are:

1. N. VULGARIS, *head obtuse and lunated in front.* Pl. II. Fig. 1–8. Spio vulgaris, *Johnston* in Zool. Journ. iii. 335 and 487.

HAB. The shore between tide-marks. Very common in Berwick Bay.

Description.—This worm is from 3 to 4 inches in length, of a yellowish-brown colour, dusky in places from the contents of the intestine, and marked with red cross lines from the overlapping branchial filaments. The head is prolonged above the mouth into a sort of triangle, the base being outwards, and each angle prolonged into a short conical point somewhat contractile. There is a black spot on the vertex, and the bases of the tentacula are also stained with black, where the eyes, which are very small, are placed in pairs, but in several specimens I have not been able to detect these organs. The antennæ are rather more than half-an-inch long. The last ten segments appear to be defective in the branchiæ, and to have a more developed ventral foot and longer bristles than any of the others.——Plate II. Fig. 1, N. vulgaris of the natural size. 2. The anterior portion enlarged. 3. A view of a segment cut transversely. 4. The caudal extremity. 5. A branchial filament separately. 6. Another view of a branchia. 7. Bristles much magnified. 8. Oviform bodies.

2. N. CONIOCEPHALA, *head conical.* Pl. II. Fig. 9–13. Spio viridis, *Johnston* in Zool. Journ. iii. 486.

HAB. In sand near low-water mark. Berwick Bay, not uncommon.

Description.—Worm from 4 to 8 inches long, as thick when full grown as the little finger of a boy, flattened dorsally, rounded on

the ventral aspect, down the centre of which a blood-vessel runs from one extremity to the other, of a flesh-red colour anteriorly, but backwards the colour is usually a dull dirty green, with red lines and dusky blotches. Head conical, pointed like a snout, pale: proboscis very short with a lobed orifice: eyes 4, minute, placed at the base of the antennæ in pairs, but apparently often wanting: antennæ approximate at the base, from half to an inch in length. Segments narrow, numerous; the filaments of the anterior fringed to the point with a broad membrane, those of the middle free and rather long, but becoming very short on the posterior. Feet much like those of the preceding, but proportionally less developed. Anus stellate.

This species inhabits our shore at low water-mark, and is seldom found with the preceding, which loves a station higher up. It is rare that an entire specimen can be got, the animal breaking with ease into several portions, and throwing off its antennæ.——Plate II. Fig. 9. N. coniocephala of the natural size, the tail wanting. The specimen was one of unusual size. 10. The proboscis. 11. An antenna magnified. 12 One-half of a cross section of an anterior segment. 13. A similar view of a segment from near the middle.

The Spio crenaticornis of *Montagu*, Lin. Trans. xi. p. 199. Tab. 14. fig. 6, is nearly related to this genus; but a new examination of the worm is necessary to determine its true place in the system.

VI. Cirratulus,* Lamarck.

Character.—*Body vermiform, subcylindrical, the segments narrow and numerous; head small, conical, labriform, without any organ of sense; mouth inferior, naked, emandibulate; two or three first segments apodal and naked, all the others with small papillary setigerous feet forming a double series along each side, and many of them, especially the anterior, carrying dorsally long tubular tortuous filaments; anus dorsad, terminal, simple.*

1. C. Medusa, *proper branchial filaments originating from the anterior margin of the 4th segment; the posterior filaments few and scattered.* (Plate III. Fig. 7–12.)

Cirratulus Medusa, *Johnston* in Mag. Nat. Hist. vi. 124. fig. 13.—C. fuscescens et C. flavescens, *Johnston* in Jameson's Edin. Phil. Journ. xiii. 219.

* Cirratulus—formed from *cirratus*, curled.

Hab. Under stones between tide-marks; abundant in Berwick Bay.

Description. Body from 3 to 6 and sometimes even 9 inches long, tapered a little towards each extremity, rather less than a quill in calibre, the ventral surface flattened and furrowed down the centre, of a dirty brown or yellowish colour much stained from the internal viscera: head somewhat flattened, biannular, small, naked, marked on each side with a curved black line, the two segments posterior to it without filaments or feet: segments numerous, rather narrow; from the anterior margin of the fourth, which becomes suddenly larger, arises on each side, but dorsad, a bundle of filaments shorter, generally more tortuous and of a paler colour than the others, which arise from the sides of the following rings down about one-fifth of the length of the animal, and a few remote filaments are dispersed irregularly on the rest of the body: there are two rows of slightly protuberant small papillary feet on each side, with a considerable interval between the rows, each papilla armed with from 3 to 6 bristles, the bristles of the superior longer, slenderer and more acutely pointed than those of the inferior, which are few in number, stout and curved near the apex: no spines: anus terminal, forming a plain aperture with a dorsad aspect.

C. Medusa lurks under stones, in a somewhat muddy soil, in which it forms burrows similar to those of the earth-worm, and into which it retires slowly when disturbed. The filaments by which it is so remarkably distinguished, and which curl around it like as many parasitical worms, are the branchiæ, or organs through the medium of which the blood is exposed to the influence of the air, and fitted for the purposes of life. They take their rise from above the dorsal feet, some from the back itself, are about 20 in number on each side, tortuous or extended, unequal in their lengths, the shortest being placed anteriorly, but the gradation is not regular; and they are very easily removed by handling or by immersion in fresh-water. They consist of a large central vessel carrying red blood, surrounded by a white gelatinous transparent membrane, and are consequently of a fine red colour; but this is liable to variation, for some, particularly the anterior bundles, are often quite white, and others, again, are occasionally spotted, as from a partial stagnation of the blood in them. When magnified they appear to be crenulated, but are not fringed with cilia. Messrs Audouin and Milne-Edwards propose to restrict the term *branchiæ* to the paler kind which are inserted in fascicles on the margin of one of the anterior segments, and they call the scattered filaments *cirri*, but surely

their function and structure being acknowledged to be identical, a name expressive of any difference in either respect is liable to objection. They also describe the feet as composed of two branches, but this is a mere anatomical fiction, for there is really no common base and no bifurcation, the upper and lower papillæ being separate and divided by a considerable interspace; and on the posterior segments these papillæ are so slightly protuberant as to be scarce perceptible. The bristles are of two kinds: from the superior papillæ there issue about six, three of them long and slender, and three shorter and comparatively stout,—all of them simple, unjointed, and acute. The bristles of the inferior papillæ vary from three to one only in the caudal segments, and they are all stout and curved like the italic letter *f*.

Plate III. Fig. 7. Cirratulus medusa of the natural size. 8. Head and anterior segments much magnified. 9. A view of the mouth. 10. Transverse section of a segment from the posterior part of the body. 11. A side view of two segments from near the middle, shewing the spines greatly magnified. 12. The tail.

In the Linnæan Transactions, Vol. ix. p. 110, Montagu has described, under the name of TEREBELLA TENTACULATA, a second species of this genus; and to make our essay as complete as our materials will allow, his description is here given in his own words.

"Body long and slender, composed of more than two hundred annulations, each furnished with two fasciculi of very minute bristles: no eyes: branchiæ obscure: from the sides issue very long, red, capillary appendages, most numerous near the anterior end, but the point or snout is destitute of them, and becomes more acuminated, the mouth is placed beneath: the posterior end is also obtusely pointed.

"Length, eight or nine inches.

"The colour of the upper part is olive-green, the under part dull orange.

"The lateral filiform appendages are continually in motion, appearing like slender red worms contorting in all directions round the animal; after death these usually curl up, when they first become orange, and in a little time wholly lose their colour.

"This curious species of vermes was taken from a piece of timber that had been perforated by Pholades, and was destitute of any natural covering.

"It may be doubted whether the animal in question be nearest allied to the Terebella or Nereis, or even whether it strictly belong to either."

REVIEWS AND CRITICAL ANALYSIS.

I.—*Icones Plantarum, or Figures with brief descriptive characters and remarks of New or Rare Plants, selected from the Author's Herbarium.* By Sir W. J. Hooker, K. H. LL. D. &c. Parts I. and II. 1837.

This is a valuable publication; economical, and yet rich in the number and variety of its illustrations; and we sincerely hope it may receive such a portion of encouragement, as shall constitute it the first of a long series of works got up in a similar style. This "Icones Plantarum" is *par excellence* a useful work. The plates are executed in lithography, and although in point of beauty they cannot be compared with similar productions by our continental neighbours, they are evidently faithful and characteristic,—requisites of far higher importance to the real naturalist than artistic elegance of engraving. In regard to subjects, the author has wisely allowed himself the widest range; and we have in the two parts before us, Fungi, Mosses, and Ferns, besides the numerous phænogamous plants selected on account of their rarity, singularity or beauty.

Of the letter-press, it is needless to say—coming as it does from the pen of Sir W. J. Hooker—that it is accurate and scientific. Professing, however, to be brief, it is in our opinion too much so: brief, we think, rather to the disadvantage of the work. For example, of about sixty new species, (excluding mosses,) considerably more than one-half are unaccompanied by any observation upon specific affinity; a subject, in these days, of the greatest importance. There is another circumstance also, in connection with the letter-press, which we think it right to notice, and that is, the absence of all characters and descriptions whatever of the fifty-five species of mosses figured on plates xviii–xxiv. It is true, that the reader is informed in a note, that descriptions of these mosses will be found in the Companion to the Botanical Magazine. But there is nothing in the title-page of the "Icones" which can lead the purchaser to expect occasionally, figures without descriptions. In the present instance, the possessor

of the "Icones" must be content to go without descriptive letter-press to fifty-five species, or buy another and distinct work; to say nothing of the inconvenience of such an arrangement.

Sir W. J. Hooker has presented us with figures of such a host of interesting plants, that it is not possible to enter upon any detailed observations. There is a new genus of Cruciferæ established at t. xliii. the characters of which we transcribe.

TROPIDOCARPUM.

Sepala oblonga, concava, basi æqualia. *Petala* obovato-subspathulata. *Filamenta* nuda: *Antheræ* subrotundæ. *Germen* oblongum, in stylum attenuatum. *Stigma* obtusum. *Siliqua* lateraliter compressa, sessilis, polysperma, valvis acute carinatis. *Dissepimentum* nullum!—Herbæ parvæ, annuæ. Folia pinnatifida. Racemi foliosi. Flores parvi, albi. Silquæ erectæ, nunc breves, subsiliculosæ.

A second species of this genus is figured at t. lii. Both were collected in California by the late Mr Douglas.

Were we to fix on any *one* plant figured in the hundred plates before us, as pre-eminently interesting, we should select *Dendromecon rigidum*, Lindl. (t. xxxvii) a papaveraceous shrub! discovered by the same lamented botanist in California. Let persons who desire to encourage botanical science purchase this work. Its merit is not to be measured by its extraordinary cheapness.

II.—*Dr Lardner's Cabinet Cyclopædia. Natural History. Natural History and Classification of Birds.* By W. SWAINSON, Esq. Vol. i. 12mo. London, Longman & Co. 1837.

To complete our review of the series of volumes which have appeared in Dr Lardner's valuable Cyclopædia devoted to Natural History, we now proceed to notice the third, "The Natural History and Classification of Birds," forming the first of the second department of the Vertebrata, one in which the author has already distinguished himself, and which he has materially advanced by his numerous and valuable publications.

After noticing the station occupied by birds among the Vertebrata, viz. between the Mammalia and Reptilia, to the latter of which he conceives its union is effected by the fossil genus *Pterodactylus*, rather than to the affinity supposed to exist between the Penguins and Tortoises, he refers to the primary types, as designated in ornithology, and which take their titles from the five orders of the class, viz. the *Raptorial*, the *Inses-*

sorial, the *Rasorial* or scansorial, the *Grallatorial* or tenuirostral, and the *Natatorial* or aquatic. The pre-eminent type is the Insessorial, as it corresponds with the order Insessores, the most highly organized of the class. The Raptorial or subtypical is represented in its highest developement by the Raptores, and corresponds to the Feline group among quadrupeds. Of the aberrant types, the Natatorial or aquatic is distinguished by the shortness and limited power of the feet, the broad obtuse form of the bill, and the head being always large in proportion to that of the other types. The Grallatorial or tenuirostral type is shown in birds, as in quadrupeds, by the length and slender shape of the bill or jaws: the opening of the nostrils is also long and slit-like, and it is further distinguished by great swiftness, either of wing or foot. The Rassorial type is inferior only to the Natatorial in bulk. "Birds," he adds, "belonging to it have the tail greatly developed, or of peculiar structure; the great size of the foot in all its proportions is another characteristic, and the groups which represent this type in some mode or other evince their attachment to man." A short review is then taken of the five orders and their peculiar characters, with a glance at the analogies they present with Quadrupeds. The three following chapters are entirely devoted to a useful and interesting exposition of the external anatomy of the class, as it is from the outward organization that he takes the characters of his groups, illustrated with a profusion of beautiful wood-cuts, which point out the various peculiarities of structure or form, in the different parts of the body, and render easily intelligible to the student what otherwise is frequently found difficult to explain, or convey a correct idea of, by language alone. After enumerating the terms by which the various external parts of the body are called, and which are easily understood by a reference to the figure, he commences with the peculiarities of the head as seen in the shape of horns, wattles, or crests, of each of which he cites various instances and examples. The peculiarities of the eyes and ears are then adverted to, followed by some interesting observations upon the tongue, which varies in form and structure according to the nature and quality of the food upon which the individuals subsist. Among those which have it of very small size, we are surprised he should have omitted the cormorants, in which genus it is very diminutive or rudimentary, and here also it is indicative of a peculiar habit, as these birds, like the night-jars and swallows, gulp or swallow their food entire. The form and position of the nostrils next claim attention, and the remainder of the chapter is occupied with the various aspects of the bills or jaws

of birds, each modification or peculiarity being illustrated by a characteristic wood-engraving. The various modifications of form, exhibited in the wings and tail, the great organs of aerial motion, occupy the greater portion of the next chapter. The principal varieties of the form of the wings are considered under the heads of *acuminated*, as in the Swallows, Terns, &c.; *Falcate*, a form possessed by some of the Humming-Birds; *Pointed*, as in the Crows, Flycatchers, &c.; *Rounded*, as in the common Wren, and also in most of the Rasorial order; *Ample*, as in the Heron, and in the genera Rupicola, Promerops, &c. The last are the *Abortive* or *Abbreviated* wings, as in the Cassowary, Apteryx, Penguin, &c. In the tail, the other great organ used in flight, the modifications are even more numerous than those of the wings; he enumerates and describes no less than fourteen, under the titles of *Even*, *Rounded*, *Fan-shaped*, *Graduated*, *Cuneated*, *Arcuated*, *Spathulate*, *Slender*, *Forked*, *Lyre-shaped*, *Boat-shaped*, *Compressed*, *Plumed*, and *Scansorial*, all of which are minutely described, and contrasted with each other in a manner which cannot fail to be understood, on consulting the figures which accompany the text. The various modifications of those essential organs the feet are next considered, and to this part of the work we would direct the especial attention of the student, as it is in a great measure from the leading variations in their structure that the primary characters of the orders are derived, and besides natural groups are generally indicated by the subordinate modifications they undergo.

In the raptorial foot he points out some peculiarities in the relative position of the toes, which appear to have been overlooked, but which mark a striking distinction between the foot of birds belonging to this order, and that of the typical Insessores. Of the feet of this latter order he gives a detailed description, and shows how beautifully each change is in accordance with the economy of its members. We particularly direct attention to the gradations of the scansorial form of foot, which he has traced with a precision and minuteness that shows an intimate and thorough acquaintance with the subject. The remainder of this portion of the volume is taken up with observations on the voice and nests of birds. In regard to the voice, though agreeing with the author in many of his remarks, we think that the song of birds, or its equivalent, is more connected with the feeling of love or the reproduction of the species than he seems willing to allow. We believe it, in the first instance, to be given to the male for the especial purpose of attracting the females; at the same time we do ot deny its exercise, in such birds as possess it

in an eminent degree, as a solace to their mates during the tedious course of incubation. All male birds, we believe, in addition to what may be called their *ordinary* or *constant* notes, which may be supposed analogous to speech, and which seem to direct and regulate their general or ordinary movements, possess other intonations and powers of voice, apparently given for special purposes, and which are only called into action during a certain period of the year. In the majority of the feathered race, these additional or temporary powers of voice are limited in extent, and frequently confined to one or two notes, and it is only in a few groups of the Insessores that we find them developed in an extraordinary degree, or worthy the name of song. But whatever be the extent of this power, whether confined to a few monotonous notes, as in the Buntings, the Titmice, and various others, or embracing the varied intonations, as well as the sweetness and melody of the Nightingale, Mavis, &c.; in all the species it answers a similar end, and the utterance is attended with a like effect, viz. the attraction of the opposite sex, in order to insure the reproduction of the species. During the late autumnal and early winter months, or from August to the beginning of January, in most birds it is entirely lost, or if attempted by song birds, is always imperfect in cadence and extent, and it is only fully regained when the turn of the year again invigorates their frame, and produces those remarkable changes in the constitution which every practical ornithologist cannot fail to have observed. In most if not all cases it is only regained by degrees. This is the case with all our native birds, and we have known weeks to elapse before a Chaffinch has been able to compass his short but sprightly lay. Of nidification our author seems to have little practical knowledge, and his observations are mostly drawn from the writings and descriptions of other authors. All the owls do not, as he says, "select a hole wherein to deposit their eggs, whether it be in a tree, or in a building, or upon the ground," for the long-eared owl, *Otus vulgaris*, almost invariably selects the deserted nest of the carrion crow, and the short-eared owl, *Otus brachyotos*, deposits her eggs upon the surface of the ground in wild moorland wastes. In speaking of pensile nests, he mentions that of the Bearded Titmouse, *Par. biarmicus*, as likely to exhibit a modification or approach to this form; but adds, "that no British author has yet described it." Had he turned to the last edition of Selby's Illustrations of British Ornithology, he would have found a note in which the site and structure of the nest is described; and which prove that it belongs to the ordinary form.

With the contents of the next chapter, which treats of Ornitholo-

gical Bibliography, we are not altogether satisfied. The lists of works he has given are certainly not so complete or so extensive as they ought to have been, although he professes to enumerate such only as are essential to the student, or eminently beautiful for their execution; nor do we think his estimate of their peculiar merits are always correct or altogether impartial. We do not object to Mr Swainson's introducing so many of his own works under their respective heads, to which he conceives they belong, but we do think that those of a similar character and import by other authors should have met with the same liberal treatment. Why has he not, under the head "Partial systematic works," where both series of his own Zoological Illustrations have been placed, also inserted another work as extensive, and, we believe, as useful to the ornithologist as his own. We mean the quarto work of Sir William Jardine and Mr Selby. Several continental works of eminence are also altogether omitted, or else merely glanced at. We perceive no mention of the names of Bechstein, Faber, Nilson, and various others, and though Kuhl's *Conspectus Psittacorum* is mentioned in laudatory terms, the able monograph of Wagler of the same family, published subsequently to that of Kuhl's, is passed over without notice.

From ornithological bibliography he passes to the consideration of those rules instituted by the most eminent naturalists of an earlier date, and which have since received the sanction of their followers, and been admitted as laws or aphorisms not to be violated, in the construction of generic, subgeneric, and specific names. Upon each of those he makes some pertinent observations, and we trust that what he has said on that law which announces that "the highest reward of a naturalist is to have a genus called after his name," will meet with the consideration it deserves, and tend to put a stop to a practice which of late years has rapidly been gaining ground to the detriment of science, viz., that of complimenting individuals, many of them altogether unknown in the records of ornithological science, by imposing their names upon newly discovered species, a practice which deprives the true naturalist of what has been proclaimed his highest reward, and brings into disrepute and contempt what was once esteemed a scientific honour. We also agree with Mr Swainson in the sentiments he has expressed in regard to vernacular nomenclature, a subject that of late has undergone considerable discussion, and though we have carefully perused the arguments of those who advocate what they consider a reformation in the system, we cannot perceive that the change they contemplate would be attended with the smallest possible advantage. To the

scientific naturalist it can be none, and it is not likely to be adopted by those for whom it is alone intended, viz. the unscientific, or great mass of our population. No further proof, we think, is wanted of the inutility and difficulty of substituting more appropriate vernacular names, for those now in general use, than in the lists we have already seen published, where similar objections may be urged against the new coined names as have been preferred against the old.

The next chapter, which concludes the introductory part of the work, treats of collecting, preserving, and arranging birds. Each of these heads, he discusses at considerable length ; and we recommend the attentive perusal of the chapter to all who think either of collecting for themselves, or for the benefit of public institutions. Under the first head he shows not only what foreign birds are best worth collecting, (the most common,) but points out those countries whose ornithology has hitherto been least investigated, directing also the attention to certain groups, the knowledge of whose habits and economy would be of great importance to the science.

The Taxidermic directions are full and easily understood, but are restricted to what is now termed leaving the specimens in *their skins*, in contradistinction to those that are mounted or set up in the attitudes of life. This is a mode now generally adopted by scientific ornithologists who possess collections of their own, not only for the convenience of stowage and room, but for the facility it affords for comparative examinations, which can only be satisfactorily done by handling and close inspection.

We now come to the systematic part of the volume, commencing with the Raptorial order or Birds of Prey. Of this order he considers there are only three families now in existence, viz. the *Vulturidæ*, *Falconidæ*, and *Strigidæ ;* for the genus Gypogeranus, which Mr Vigors thought might probably represent one of the primary divisions of the order, our author thinks more likely, from its structure and apparent affinities, to belong to the Vulturidæ, probably constituting its grallatorial type. The typical and subtypical genera of the Vulturidæ are represented, the first, by the true vultures, of which *V. fulvus* may be considered a type, the other by the American species or genus Cathartes. The principal distinction between these two groups consists in the opposite form of the nostrils, which in the genus vulture are placed transversely across the bill, whereas in Cathartes they are linear in form, and placed parallel with the margin of the bill. The caruncles and wattles observed in certain species of Cathartes he only considers in the light of secondary cha-

racters. The rasorial type of the family he considers to be that remarkable Australian bird, first described and called by Latham the New Holland vulture, but which some later writers have noticed as more closely allied to the rasorial order. This, in fact, is the opinion we arrived at after examining two perfect specimens of this bird, in which the bill appeared to have more of the rasorial than the raptorial form, and we recollect that the nostrils were partly covered with a protecting scale. The tail, which he acknowledges possesses more feathers than the true vultures, also exhibited that duplex or folded form possessed by many Gallinaceous birds, and the feet and legs were certainly as much akin to those of the Cracidæ and other Rasores, as to those of the rapacious order.* Much, no doubt, as to its real station in the ornithological circle, will depend upon its peculiar habits and economy, of which we are at present ignorant, but we think it is as likely to prove a Raptorial form of the Rasorial order, as the Rasorial type of the Raptores. The fissirostral type of the family is distinctly marked in the bearded vulture of the Alps, forming the genus Gypaætus, and which in its form and habits marks the direct passage to the eagles in the family of the *Falconidæ*. This division, he observes, exhibits the perfection of the order; its members are distinguished by a much shorter and sharper bill more or less toothed, and by very acute and strongly curved talons; they are lighter and more graceful in form, and more courageous than the vultures; they prey, also, almost exclusively upon living animals, and the geographic range of the family is almost universal. The primary divisions of the Falconidæ he considers typified by the following genera—*Falco, Accipiter, Buteo, Cymindis, and Aquila,* the two first constituting the typical and subtypical divisions, the remaining three, the aberrant. The analogies of the family with the tribes of the Insessores stand thus:

Falco,	Conirostres,
Accipiter,	Dentirostres,
Byteo,	Fissirostres,
Cymindis,	Tenuirostres,
Aquila,	Rasores.

These analogies and relations he proceeds to trace with great skill, and we regret that our limits will not permit us to follow them in detail. He then enters into the examination of the five leading generic groups, commencing with the genus Falco, as the most typical of the whole family. The subgenus Falco, the first noticed,

* For a figure and description of this bird, see Vol. II. plate 66, Illustrations of Ornithology, by Sir William Jardine, Mr Selby, &c.

contains the true Falcons, distinguished by a single tooth on the upper mandible, with an incipient festoon or sinuation behind it; next to it he places the subgenus *Harpagus*, (the Bidens of Spix), with two small teeth in the upper mandible, the wings more rounded, and the scutellation of the tarsi different from that of Falco. The passage between Harpagus and Falco is effected by the *F. cæruleszens* of Linnæus. The third group is marked by *F. lophotes* of Temminck, evidently an aberrant form, and probably the rasorial type. The fourth is his subgenus *Aviceda*, a bird with which we are not acquainted; and the fifth he thinks may probably prove to be the *Gampsonyx Swainsonii* of Vigors, which in some respects seems to unite the characters of Buteo and Falco. The circle of the genus, or division Accipiter, he commences with *Ictinia*, Vieill. as a form connecting *Lophotes* with the accipitrine falcons: this is followed by the typical subgenus Accipiter, well characterized by the sparrowhawk. The third is that of *Astur*, or goshawk group, and as a fourth form belonging to it, he proposes the Pondicherry eagle, (*Aquila Pondicerianus*, auct.) a bird which, in our estimation, has a nearer affinity to the aquiline group. The fifth form has not yet been recognized.

The genus Aquila, the first of the aberrant groups of the Falconidæ, contains four types, represented by *Pandion*, *Harpyia*, *Aquila*, and *Ibycter*, the second and third being the typical and subtypical groups, while *Pandion* represents the aquatic or fissirostral type, and *Ibycter* the rasorial: the fifth, or tenuirostral form, he thinks, may possibly be represented by *Asturina*, Vieill.

The Milvine or kite division, represented by the genus *Cymindis*, he enters by means of *Polyborus*, an American group nearly related to *Ibycter;* this is followed by the genus *Cymindis*, the pre-eminent type, all the members of which belong to South America. Next to it he thinks it likely that the genus *Elanus* will take its place, and this view we are inclined to adopt, looking at specimens of species now before us. The bill we perceive is as much hooked, and similar in form to that of *Cymindis*. The characters of the feet are peculiar, the interior toe being longer than the exterior, and the hinder toe shorter than either: the claws are sharp and strong, and all of them rounded beneath, as in Pandion; the under one in addition has a sharp projecting edge on its inner side. The wings are long, the feathers broad, with the first quill emarginate near the tip. The tail is nearly even, or very slightly forked. This form is immediately followed by Vigors's genus, *Nauclerus*, represented by the fork-tail kite of America, which, from its swallow like form and

powers of flight, evidently forms the fissirostral type of the Milvine circle, thus bringing it into immediate contact with the common kite of Europe, which we think he very properly excludes from this division, and places among the buzzards as its fissirostral form. The fifth form of Cymindis he thinks it is not improbable may be Vieillot's genus *Circætus*, but we know too little of this group to give an opinion as to the correctness of the supposition. The last division is that of the Buzzards, which, by some of its members, leads back again to the typical Falcons. This group, as he observes, might with more propriety have been called *Harriers*, as it is the genus *Circus* which exhibits the fissirostral type of the whole family in the greatest perfection. The subtypical form he considers to be represented by *Buteo lagopus*, in which subgenus he also leaves the common buzzard and other similar forms. In regard to the genus *Pernis* (honey-buzzard), had the author enjoyed the opportunity of examining the specimens now before us, he would, we think, have found little hesitation in pronouncing it to be the tenuirostral type of the division, as it exhibits the characters of a weak and slender bill, with feet and claws less raptorial in structure than any of its congeners. The common kite, *Milvus vulgaris*, Temm. as we have previously observed, is considered the fissirostral form of the division. The fifth or rasorial type is not indicated by Mr Swainson; may it not be represented by the *Falco cristatellus*, Temm. the *Spizaetus cristatellus* of Jardine and Selby?

From the Falconidæ, he proceeds to trace the natural series of the Strigidæ or owls, confining his exposition to the primary divisions and genera only. The passage from the Falconidæ is well marked in the genus *Circus*, where we perceive the first indications of that peculiar ruff of tiled feathers, which surrounds the head, and is seen in its highest developement in the Striginæ or typical owls. The formation of the ear, the eye, and facial disk, being the peculiar distinctions of this family, he naturally forms his primary groups upon the greater or less developement of these organs. The first, or typical group is therefore, that in which the facial disk is very large and perfect, with large ears, and in general an ample *operculum*. The second or subtypical, with a large facial disk, but small or moderate sized ears, the head furnished with egrets. The third or aberrant group with the circle of the ear small and destitute of an operculum, the facial disk imperfect or obsolete, and the head without egrets. This group is as usual divisible into three, each of which possesses its distinguishing characters. The first group is typically represented by the common white or barn owl of this

country, (*St. flammea*); in it he also places, and we think very properly, our long and short-eared owls (*Otus vulgaris*, and *Ot. brachyotos*), considering them rasorial types. A third form is that of *Strix Tengmalmi*: to this group he gives the name of *Scotophilus*. A fourth is represented by the huge *Strix cinerea* of the northern zoology, for which he proposes the generic or subgeneric name of *Scotiaptex*. The fifth, which ought to represent the raptorial type, is not indicated: why should not the *St. stridula* or some of its nearly allied congeners supply the deficiency?

The 2d division, or as he terms it genus, *Asio*, contains, 1st, the true horned-owls, of which the great European horned-owl, and the Virginian species may be considered representations. A second form is that of *Bubo arcticus* of the northern zoology, now made *Heliaptex arcticus*, and a third he thinks is represented by the Scops Owls. As the only type of the first aberrant group, stands the great white owl or genus *Nyctea*, distinguished by its very small ears, and without any ruff or series of stiff feathers encircling the head, the eyebrows also perfect like those of the falcons, and its habits are diurnal. His genus *Nyctipetes*, formed of the small South American owls, which possess no marginal ruff, with small ears destitute of an operculum, and which are perfectly separated from the small European owls, or his genus *Scotophilus*, form a fourth group; and the fifth is composed of the hawk-owls or genus *Surnia* of Dumeril, possessing a small head, without a facial disk, a long cuneated tail, and diurnal habits. Such is his outline of the primary groups of this hitherto confused, and, we may add, neglected family of the order, and so far as we can judge from the forms we have been able to consult, they appear founded on the true affinities of the species. It will be seen that he has rejected some of the modern genera, as *Noctua*, *Ulula*, &c. at the same time he has found it necessary to institute others, such as *Scotiaptex*, *Scotophilus*, *Heliaptex*, and *Nyctipetes*. Much, however, remains to be done to fill up the details of the various groups, which can only be effected by a strict analysis of the species, a matter not easily accomplished, as there are few collections which contain a sufficient number of forms belonging to this family, wherewith to institute the necessary comparison and examination.

The concluding chapter enters upon the consideration of the Insessorial order; but as the exposition only extends to one of its primary divisions, viz. the Dentirostral tribe, we shall merely observe, that he traces the whole of its analogies with the other tribes and families of the order, in a manner that intimates a thorough acquain-

tance, and a deep analytical investigation of the subject. Any further observations we must postpone till after the publication of another volume, in which the subject is pursued; having already extended our analysis to a length we fear both tedious and tiresome, and only to be justified or excused by the importance of the work.

III.—*An Analysis of the British Ferns and their Allies. With Copper-plate engravings of every Species and Variety.* By George W. Francis. Lond. 1837. 8vo.

A work we can honestly and heartily recommend,—which ought to be in the hands of every student of the British Ferns, if he desires to have a safe and interesting guide in the investigation of this peculiarly attractive family, and if he is anxious to encourage the labours of an enthusiastic fellow-botanist.

In the "Introduction" the author enters with some detail into the characters, structure, reproduction, geographical distribution, and virtues of the families in which British species occur,—following which there is a synopsis of the genera. The species are then described one by one. Here we have a very copious list of Habitats, a selected number of Synonyms derived from personal study of the respective authors, and a good description, embracing a regular specification of all the variations and varieties, evidently deduced from an extensive comparison of specimens from many and distant localities. There is, however, a singular variety of Aspidium Filix-mas which does not seem to have come under Mr Francis' notice,—where the frond, not above a span in height, is simply pinnate with undivided oblong crenated leaves. It is something like Grammitis ceterach; and that the peculiarities are not dependent on immaturity is obvious from the fact that the plant is loaded with fruit. We are assured that this variety is frequent in some parts of Ireland, although not mentioned in the "Flora Hibernica."

The figures are miniatures, but, with scarcely an exception, happily express the habit and character of the species, and will, we are confident, answer every purpose that a figure is intended to answer. They are vastly creditable to the talent and skill of the author, by whom they are all drawn and etched; and when we are told that they are his first essays in these arts, we view them with a considerable portion of admiration, for their neatness and elegance is really remarkable.

Were we inclined to find any fault with the work it is that there is less of popular matter than there might have been: illustrations

from our poets would have been ornamental, and not incompatible with scientific accuracy or pretension. Our poets—old and living—have sung of Ferns many a time and oft; they were plants of power in the superstitions of our forefathers, who also drew from them more copiously than we now do for a supply of some little wants, as indeed, the author has told us, but we should have been pleased to have seen some quaint quotations interwoven with the text in illustration of them. Perhaps too the author would have done well to have given a short separate chapter indicating the distribution of our Ferns in relation to their latitudes, peculiar soils and sites; and we could have wished that, in giving the *habitats*, the classification of them into English, Welsh, Scottish, Irish and Insular had been more systematically attended to than it has been.

PERIODICALS.—*British.*

Loudon's Magazine of Natural History. New Series. March and April 1837.

I. *Zoology.*

BLYTH on the Psychological Distinctions between Man and all other Animals, p. 131.——STRICKLAND on the Inexpediency of altering established Terms in Natural History, p. 127.——WESTWOOD on Generic Nomenclature, p. 169.——STRICKLAND's Rules for Zoological Nomenclature, p. 173.——Dr MOORE on the Birds of Devonshire, p. 113 and 176.——HOY's Notice of two species of Tringa new to the British Islands, with a list of the rarer Birds killed in Suffolk, and the adjoining borders of Norfolk and Essex, from the autumn of 1835 to December 1836, p. 115.——W. L. on the breeding of Woodcocks in Selkirkshire, with observations on the Habits of the Black and Red Grouse, and Carrion Crow in Scotland, p. 118.——BLYTH on the Habits and Peculiarities of the common Bottletit or Mufflin (Parus caudatus of Linnæus,) p. 199.——G. W. on the supposed different species of Viper, p. 183.——Observations upon the Salmon in Loch Shin in Sutherland, by JAMES LOCH, M. P. p. 208.——GRAY's Description of some singularly formed Orthopterous Insects, p. 141.——STUTCHBURY on Cypræcassis, a new genus of univalve shells, p. 214. Cassis rufa of Bruguiere is the type of this well-defined genus.——On Nematura of Benson, a new genus of univalve shells, by G. B. SOWERBY, p. 217.——CHARLESWORTH on a new Fossil Shell from the Coast of Suffolk, p. 218.——RICHARDSON's Observations upon the Chronologi-

cal Arrangement of fossiliferous Deposits, by a reference to their organic contents, p. 122.

II. *Botany.*

Letter from GOLDING BIRD, Esq. in Reply to some observations published in the "Edinburgh Journal of Natural History" upon the cause of Vegetable Divergence, p. 180.

The SHORT COMMUNICATIONS relate to—(1.) Preservation of Zoological Specimens. (2.) Variation in the Plumage of Birds. (3.) The Cross-bill. (4.) The Robin. (5.) Sphinx atropos. (6.) Helix virgata.

Companion to Botanical Magazine. By SIR W. J. HOOKER, Professor of Botany in the University of Glasgow. (Continued from page 578 of Vol. i.)

THE number for February last contains an interesting paper by Dr Graham, Professor of Botany in the University of Edinburgh, on "the Gamboge tree of Ceylon." Specimens of the tree have been forwarded to Dr Graham and other scientific persons in Scotland, together with the pure gamboge, by their invaluable correspondent, Mrs Colonel Walker. The result has been, that the tree of Ceylon producing the gamboge is different in species and genus from any of those which were supposed to produce the drug. The gamboge yielded by it is equal in quality to that imported from Siam, but regarding this there seems to exist no authentic record from what plant it is produced. Dr Graham has formed a new genus from the Ceylon plant, *Hebradendron*. He refers it to the class and order *Monœcia* (or *Diœcia*) *Monadelphia*, and places in it two species; 1. *H. cambogioides*, having for synonyms *Garcinea morella*, *Stalagmitis cambogioides*, Morris, Cat.—2. *H. ellipticum*, *Garcinia elliptica*, Wallich. The paper will be found worthy of perusal.

Notes upon some genera and species of Orchidiæ in the collection formed by M. Drege at the Cape of Good Hope, by J. Lindley, Ph. D. F. R. S. &c.——A brief Biographical Sketch of the late Richard Cunningham, Colonial Botanist in New South Wales. This botanist, whose untimely end we had to record in an early number of this Magazine, succeeded as Colonial Botanist to the late Mr Frazer in 1832, on the recommendation of Mr Brown. His career has been a short one, and we can now only hope that the discoveries he had so successfully commenced will be wrought out by his brother, who has been appointed to the vacant office. The next paper will be now read with interest—Flora Insularum Novæ Zelandiæ precursor, or a specimen of the botany of the islands of New

Zealand, concluded by " those interesting discoveries which Richard Cunningham made during his excursions on the northern island in the portions of the years 1833–4," (arranged and edited by Allan Cunningham.) This paper commences with the discoveries of Sir J. Banks and Solander, during the first voyage of Captain Cook, and brings them down through the various voyages of discovery, including those of the Coquille and Astrolabe, to 1834.——*The number for March* begins with a continuation of the last paper, which is still further to be continued.——On the Sources and Composition of Gamboge, with an examination of some analogous concrete juices, by R. Christison, M. D., Professor of Materia Medica in the University of Edinburgh, a worthy and important supplement to Dr Graham's paper in the former number. Dr Christison has analysed the varieties of gamboge, including that sent from Ceylon by Mrs Walker. The principal ingredients in all are resin and aribin, in proportions not varying very greatly, and the conclusions arrived at are, that the proportions of the essential ingredients vary in the same species where the situation of the tree is different; that the gamboge tree of Ceylon may be made to yield a pigment as fine and perfect as that of Siam, while in its medicinal qualities it also possesses properties in the fullest perfection; and it is finally recommended that our Government, and the settlers at Ceylon, should use a little enterprise in the culture of this tree.——Illustrations of Indian Botany, principally of the southern parts of the Peninsula, by Dr Wright and G. A. W. Arnot, continued.——A description of Spartina alternifolia of Loiseleur, a new British species, by William Arnold Broomfield, M. D. concluded in the number for April. There seems to be considerable confusion in the synonyms, and also with some species which have been sent from America as the true S. stricta. The banks of the river Itchen, near Southampton, seem to be the great locality. " These Spartina swamps extend along each side of the river, beginning just above the village of Itchen, to within a few hundred yards of Norham Bridge, beyond which I have never met with either kind."——Account of a botanical excursion into Brittany, by Joseph Wood, Esq. F. L. S.——Description of some new Cistaceæ, chiefly found by Mr Drummond in the southernmost regions of North America, by E. Spach; not concluded.

PERIODICALS.—*Foreign.*

Annales des Sciences Naturelles. Zoologie, MM. AUDOUIN et MILNE-EDWARDS. *Botanique,* MM. AD. BRONGNIART et GUILLEMIN. Crochard & Co. Paris, Septembre 1836.

I.—*Zoology.*

Notes sur les caractères zoologiques des Pulex penetrans, par M. DUGES. The differences between it and the common flea are too slight to be considered of generic importance.——*Recherches sur l'Anatomie du* Pentastoma tænioides, *par* M. MIRAM.—— *Observations sur les genres Gerboise et Gerbille, par* M. F. CUVIER.—— *Observations sur les Araneïdes, par* A. DUGES.——*Analyse des travaux anat. physiol., et zoolog. présentés à l'Acad. des Sciences pendant le mois de Septembre* 1836: viz. RETZIUS *sur la structure des dents:* BODICHON *sur une espece du genre Canis:* THOMPSON *sur le tissu dartoïde:* DOMBRE FIRMAS *sur la pression atmosphérique:* DONNE *sur les animalcules contenus dans le pus:* VANBENEDEN *sur les caractères des Cétacés.*

II.—*Botany.*

DURIÆI Iter asturicum botanicum, anno 1835 susceptum, auctore J. GAY.—— *Observations sur l'ascension de la sève dans une Liane, et description d'une nouvelle espèce de Cissus, par* C. GAUDICHAND.—— Muscorum Chilensium species novas descripsit, W. P. SCHIMPER. ——*Extraits du* Botanical Register *pour l'année* 1835 *et le mois de Janvier* 1836.——A notice of DE CANDOLLE's Prodromus, Vol. v.—— *Du réveil et du sommeil des Plantes, par* M. DUTROCHET.——"Nova genera ac species Plantarum quas in regno Chilensi, Peruviano et in terra Amazonica, annis 1827 ad 1832, legit Edouard Pœppig et cum Stephano Endlicher descripsit iconibusque illustravit, volumen primum." A short notice.——"Mantissa Muscorum ad Floram Pedemontanam, auct. J. de Notaris." Another short notice.——Rhisobotrya, *genre de plante nouveau de la Flore d'Allemagne, par* J. C. TAUSCH.——"Plantæ Indicæ quas in montibus Coimbaturicis cæruleis, Nilagiri s. Neilgherries dictis, collegit Rev. BERN. SCHMID. Illustravit Dr JON. CAR. ZENKER. Decas secunda." A series of extracts descriptive of the new species described in this work.

Annalen der Physik und Chemie. VON POGGENDORF.
Vol. xxxviii. pt. 2.

On the Structure and Chemical properties of Cartilage and Bone, by J. MULLER. This paper may be considered as a sequel to that upon the Comparative Anatomy of the Myxinoidea, of which we gave

an analysis in our fourth number. It chiefly relates to the Chemical Structure of Cartilage, and the varieties of it which occur in different animals. The analysis of the cartilage of Squalus peregrinus by Chevreuil, has been followed up with great accuracy by Purkinje, and Deutsch.* The bony cartilage of the higher animals was examined by them in the form of microscopic lamella, the tissue having been previously expelled by means of acid. They then found that this substance contains many minute oval bodies dispersed through it, which, according to† Miescher, not only occur in that situation, but also in the callus of re-united bones, in bones imperfectly developed, &c. The dimensions of these bodies are estimated in English lines, at from 0.0048 to 0.0072 in length, by 0.0017 to 0.0030 in breadth. These minute bodies generally lie lengthways in the direction of the layers of cartilage, and are somewhat more opaque than the surrounding substances. It is not easy to determine whether they are hollow or solid. They seem to admit of great variety in their structure, in different parts, especially those which occur in the cartilage of the ribs, in which situation they are often found lying confusedly together, and contain apparently a sort of kernel. In the cartilaginous fishes, the contents of these bodies are more fluid, and in the cartilage of Petromyzon, they vary in different parts, in one place presenting the above-mentioned oval form, in another, cells, divided by thin cartilaginous partitions, and in a third, an intermediate state between these conditions. These bodies frequently also occur in the external, as well as the internal cartilage of certain animals, as for instance in the cuirass of the armadillo ; in cartilaginous bones they are often wanting. They are not met with in the Ostracion, in the tubercular cartilage of the sturgeon, nor in the skeletons of many cartilaginous fishes. They are identical when they are found in the cartilaginous bones of man, of the Mammalia, and of fishes, but in the other cartilage of the two former classes, they present great variations, which are arranged under three distinct heads by Miescher. The glutinous matter contained in the different cartilages is divided by the author into two classes, to which he applies the terms *colla* and *chondrine*, and he also gives the results of various analysis of cartilage in different states of ossification, and taken from various parts of the body. The structure and chemical properties of the bones of the higher animals is next described, followed by a similar detail of those of the cartilaginous fishes. M. Marchand

* Deutsch de penitiori ossium structura. Vratisl. 1834.

† Miescher de ossium genesi, structura, et vitâ. Berol. 1836.

has also extended his researches to the latter class, and finds that the ossified cartilage does not contain a materially less quantity of lime than the bones of the higher vertebrata. The spine of Squalus cornubicus, after being exposed to a white heat, till all the animal matter was consumed, left in one instance 41.55, in another 42.068 per cent. of ashes. The following is the result of his analysis.

Combustible animal matter,	57.07	Sulphate of soda, ...	0.80
Phosphate of lime, ...	32.46	Muriate of do, ...	3.00
Sulphate of lime, ...	1.87	Phosphate of magnesia, ...	1.03
Carbonate of lime, ...	2.57	Siliceous earth, argillaceous do.	
Fluate of lime, ...	a trace.	iron, and loss, ...	1.20
			100.00

The Tubercular cartilage of a large ray gave

Combustible animal matter, ...	78.46 per cent.
Carbonate of lime, ...	2.67
Phosphate of do, ...	14.80
Sulphate of do, ...	0.83
Fluate of do, ...	a trace.
Muriate of soda, ...	2.46
Sulphate of do, ...	0.70
Phosphoric acid, magnesia, and loss,	0 14
	100.00

No. 11, Vol. xxxix. contains a brief statement of the results of several experiments upon the electric rays, by M. Matteucci, who thinks that the Natural History of these animals is far from being understood, and is therefore still occupied in its investigation. M. Francis Schulze of Berlin has also communicated a preliminary statement of his experiments upon equivocal generation, and upon the metamorphoses of Amylum.

INTELLIGENCE.

ZOOLOGICAL.

Bank Vole, Bell.—*Arvicola pratensis*, Baillon, *A. riparia*, Jenyns. It is likely that this species is not very local in its distribution, as I have lately detected it in Northumberland. Two specimens, a male and female, were taken at the same time in a hang trap baited with oat-meal, in the garden at Twizell. Their appearance at once attracted my attention, as I perceived, even while they remained half concealed in the holes of the trap, that their tail was longer than that of the common vole, and yet very much shorter than that of the long-tailed field-mouse, to which, however, the colour of the back nearly approached. Upon comparing them with the descriptions given by Yarrell and Jenyns, and Bell of the *A. pratensis*, I found them to agree in every essential particular with that species. In form, the bank vole is scarcely so thick and short as its congener, *A. agrestis*, the muzzle more elongate, and the ears longer, and more distinctly seen above the fur. The hairs at the end of the tail, and which extend considerably beyond the bony part, are stiff and elastic. The crown of the head and upper parts are of a reddish-brown intermixed with black, the sides were inclined to grey, the under parts yellowish-white, the yellow more strongly indicated on the mesial line of the abdomen. The length of the head and body $3\frac{1}{4}$ inches, of the tail $1\frac{5}{8}$ inches. These are the only individuals I have yet seen, or at least that have attracted my attention as differing from the common vole. It is likely, however, that it will be found upon investigation a plentiful species.—P. J. S.

Arvicola pratensis.—My friend R. M. Lingwood, Esq. captured a specimen of this little animal, in my presence, at his house, Highlands, near Uckfield, Sussex, on the 16th of January 1837. This adds another county to those of which it is recorded as being a native.—C. C. Babington.

Rhea.—Mr Darwin has brought home among his other zoological treasures, specimens of a new or second species of Rhea, which appears to take the place of the old species in Patagonia. It is distin-

guished from the R. Americana in being about one-fifth less, and in the tarsi being reticulated and feathered below the knee.

Sivatherium.—M. Geoffroy St Hilaire and M. De Blainville have laid before the Royal Academy of Sciences at Paris, the results of their inquiries regarding the nature of this interesting fossil animal, discovered in the valley of the Markonda, in the southern district of the Himalaya. The first is of opinion that it is a species of antediluvian giraffe, and has proposed the title of *Cameleop. primigenus* for it. M. De Blainville, again, although he allows it to belong to the group of the ruminants, considers it far removed from the giraffes, and enters into a lengthened detail of his reasons for this difference of opinion. If his arguments are correct, these remains will belong to an animal which cannot be ranked in any of the known genera of Mammalia.

Surnia Nyctea, Dumeril.—On the 13th of February last a fine male snowy owl was shot three miles below Selby-on-the-moor, where it had been observed by the miller, at a mill adjoining, for a day or two previous. The moor is well stocked with rabbits, and the owl was most probably preying upon them : it appeared very shy, and when pinioned by the shot was extremely fierce. It was ultimately got into a sack and killed by pressure, when it came into the possession of my friend A. Clapham, Esq. of Potternewton, near Leeds. —H. Denny.

Cepola rubescens, Linn.—Mr P. W. Maclagan informs us that he has lately procured a specimen of this fish, which was caught off Dunure, seven miles south of Ayr, on a whiting line baited with a mussel. Its length is 15½ inches. The fisherman who brought it had seen another about six weeks ago.—*March* 20, 1837.

MISCELLANEOUS INTELLIGENCE.

Botanical Society of Edinburgh, Nov. 10, 1836.—The first meeting of the winter session was held this evening. Professor Graham in the chair. The following members were elected :—*Resident,* Dr Andrew Douglas Maclagan ; *Non-Resident,* Mr Robert Ball, Dublin ; The Rev. George Gordon, Birnie, Elginshire ; Mr Edwin Lees, Worcester ; Dr D. C. Macreight, London ; Mr M. J. F. Sidney, Morpeth ; Mr W. A. Stables, Park, Nairnshire ; Mr W. Thompson, Belfast; Mr H. C. Watson, Thames-Ditton, Sur-

rey. Mr Edwin Lees of Worcester was appointed Local Secretary for Worcestershire.

Specimens were stated by the Secretary to have been received since last meeting from Dr Tyacke, Mr Shuttleworth, Dr R. C. Alexander, Rev. Mr Rutherford, Mr Leighton, Dr Dewar, Mr Watson, Mr Carpenter, Dr Greville, Mr Cruickshank, Mr Lees, Mr Bell, Dr Barry, Mr Spencer Thomson, and Mr Maughan. Donation: "Letter by N. B. Ward, Esq., to Sir W. J. Hooker, on the growth of plants without open exposure to air," from the author.

Mr Carpenter directed the attention of the Society to the advantages which might result from their endeavouring to form a collection of vegetable monstrosities, the study of which is now so essential to the philosophic botanist,—since it is from them that the theory of structure is principally deduced, and upon them also that we may expect to found some definite laws regarding the limits of variation in each species. He then alluded to some remarks he had formerly made, on the nature of parasitic *Fungi*, with reference to Verger's researches, and stated that he considered it still an open question in general physiology, whether a plant or animal might not, by a morbid process, give origin to one lower in the scale; and, he pointed out the distinction between this view and the old doctrine of equivocal generation.

Dr Balfour exhibited a *Carex* which had been sent to him by Dr Murray of Aberdeen, found by Messrs Dickie and Templeton in August last, on rocks in Glen-Callader, and which on examination Sir William Hooker had pronounced to be *C. rupestris*, All. (*petræa*, Wahl.) Dr Graham gave a short summary of what had been done since last meeting in the way of botanical discovery, during the various excursions of the season; and particularly mentioned the following additional localities for several rare plants. *Malaxis paludosa*, found by Mr James Dewar; *Acinos vulgaris*, *Silene Anglica* and *S. noctiflora*, by Dr Dewar, the two latter abundantly; *Trifolium ornithopodioides*, by Miss Robertson,—all in the neighbourhood of North Queensferry.—*Linnæa borealis*, by Mr M'Nab and Dr Graham, near Dalmahoy Hill. *Tulipa sylvestris*, by Dr Graham, neighbourhood of Edinburgh. *Oenanthe pimpinelloides* and *Juncus obtusiflorus*, by Mr Campbell, near Dunbar. *Saxifraga hirculus*, by Mr Hunter, on the Pentland Hills, near the source of the Medwyn. *Veronica Buxbaumii*, by Dr Dewar, Mr Roberts, and Mr Bell, in various localities near Edinburgh, on both sides of the Forth.—*Carex fulva*, not unfrequent in several stations near Edinburgh. *Hieracium umbellatum*, by Dr G. M'Nab, in Glen-Clova.

Ajuga pyramidalis, pointed out by Dr Duguid to Dr M'Nab in Orkney. *Erodium maritimum* and *Jungermannia Mackaii*, found in Galloway, both new to the Scottish Flora. *Polygonum Raii*, abundantly, and *Lamium intermedium* were also observed in Galloway. *Cladium mariscus* was looked for in vain in Galloway, a station assigned for it on the authority of Mr M'Kie, (not M'Kay, as mentioned in Hooker's British Flora.) The Sutherland station for this plant must, therefore, be regarded as the only well authenticated one for it now in Scotland. *Hieracium aurantiacum* was seen by Mr Brand in Banffshire, apparently quite wild. Dr Barry mentioned having this year observed *Thlaspi alpestre* near the head of Caenlochen, in the Clova mountains, in a different spot from that where it was first discovered; *Pinguicula grandiflora*, near the top of Mount Mangerton, Killarney; and *Rhynchospora fusca*, abundant near Oughterarde, Cunnemara.

Dr Graham then alluded to a recent excursion to Ben-Lawers, in company with Sir W. J. Hooker, which, owing to the badness of the season, and its effects upon alpine vegetation, had proved a most unproductive one. On that occasion, Dr Graham stated that he had an opportunity of examining the oaks on the banks of Loch-Lomond; and after comparing them with specimens from other parts of the country, and with the figures of Martyn, in the *Flora Rustica*, he was satisfied that we have in Britain three distinct *forms* of oak, whether species or not is a different question. The most common is that figured at Tab. 10 of *Flora Rustica*;—the next, scarcely less common on Loch-Lomond, is that represented at Tab. 11;—and the third, by much the least common in the country, though by no means unfrequent at the lower end of Glen-Falloch, is extremely well represented in Tab. 12. The first is what has been called *Quercus pedunculata*, its acorns being numerous, on a long common peduncle. The second nearly resembles this in the habit of the tree, but has a fruit either sessile, or on a short, stout, and abrupt peduncle. The third differs very much in the habit of the tree, its much more acutely serrated chesnut-like leaves, and its absolutely sessile fruit. There is little difficulty, even at a distance, in distinguishing this tree from the two former, by its general appearance, and its long slender free growing branches.

Dec. 8th.—Professor Graham in the chair. The following members were elected:—*Resident*, Mr W. F. Lindsay Carnegie, and Mr William Reid. *Non-Resident*, Miss Bailey, Dublin; Dr J. Coulter, Dublin; Dr C. P. Croker, Dublin; Mr Simon Foot, Dublin; Mr George Stephens Gough, Dublin; The Rev. Thomas Dix

Hincks, LL.D.; Mr J. T. Mackay, Dublin; Mr Ninian Nevin, Dublin; Dr Jonathan Osborne, Dublin; Captain Portlock, R. E. Dublin; and Dr Robert J. N. Streitin, Worcester. Dr Thomas Bell Salter was appointed Local Secretary at Poole, Dorsetshire. Specimens were stated by the Secretary to have been received since last meeting from Mr W. Thompson, Dr Hincks, Mr Atkin, Dr Balfour, Mr A. H. Balfour, Dr Maclagan, Mr Fraser, Mr Reid, Dr Hunter, Mr Steuart, The Rev. W. S. Hore, Mr J. Ward, Mr Leefe, Mr Campbell, Mr Forbes, Mr Scott, Mr Lloyd, and Mr Macaulay.

The following office-bearers were elected for the ensuing year:—

President—Professor Graham.

Vice-Presidents—Dr Greville and Dr Balfour.

Secretary—Mr Campbell.

Joint Foreign Secretaries—Mr Forbes and Dr Charlton.

Treasurer—Mr Brand.

Curator—Mr James M'Nab.

Councillors.

Dr Neill, Mr Falconar, Dr Barry, Dr Maclagan, and Dr Pollexfen.

In consequence of various representations having been made to the Society, pointing out the difficulty of specimens being sent from the Continent earlier than January, as well as on account of several urgent requests from members for delay in sending in specimens, it was agreed that the distribution should in future take place in January and February each year, instead of the period mentioned in the prospectus.

The Secretary read a communication transmitted to him by Mr Forbes, "On a supposed new British *Polygala*," observed by him in the Isle of Man and on Dalmahoy Hill, near Edinburgh. Mr Forbes describes it as follows:—"Polygala foliis imis (parvulis) obovato-spathulatis, reliquis lanceolatis seu lineari-lanceolatis; sepalis lateralibus ellipticis, obtusis, corollâ fimbriata brevioribus, capsulâ subrotundâ demum brevioribus angustioribusque.

"Plant depressed, branchy and diffuse; flowers small, crowded, purplish blue or greenish-white; raceme when in fruit elongated and bilateral. From *P. vulgaris* it is distinguished by its habit, the smallness of its flowers, and the comparative size of the sepals and the capsule,—the sepals in the common species being longer and broader than the capsule. In general habit and the appearance of its blossoms, it bears a striking resemblance to *P. alpestris*; but the relations of the sepals to the flowers and fruit separate it from that species also." Specimens of the plant accompanied the paper.

Mr Percy read a short notice of an excursion he had made last

summer by way of Fontainbleau and Lyons to Vaucluse, with particular reference to the botany of the districts through which he passed, and in the vicinity of the celebrated "Fontaine" and "Château de Petrarque."

Dr Charlton gave a short account of a tour he had made last autumn in Denmark, stating that his present object was chiefly to point out the facilities for visiting that country, and the inducement it holds out to the botanist. The expense of living and travelling he described as being extremely moderate, the language as interposing but few difficulties —and the botany, particularly the Flora around Christiania, as being singularly attractive and interesting.

Dr Barry incidentally mentioned that the following plants, so interesting to the British botanist, had been observed by him when travelling amongst the Alps:—*Sonchus alpinus*, by the side of the glacier at the source of the Rhone, on the Furca side; *Gentiana nivalis* in the ascent from the Grindlewald to the Faulhorn; and *Astragalus alpinus*, in the Valley of Rosen-Laui. Mr Percy had also observed *Sonchus alpinus* on the Brezon, about twenty miles from Geneva, at an elevation of about 3500 feet.

W. H. Campbell, *Sec.*

Botanical Society of London.—April 22, 1837. J. E. Gray, Esq. F. R. S., President, in the Chair.—Several presents were announced, and Members elected; after which Mr Chatterley, the Secretary, proceeded to read the continuation of his paper, translated from the French of M. Decandolle, on the geographical distribution of plants used for food. The facts adduced tended to show, that cold had little influence in retarding the extension of agriculture, and that by artificial cultivation and temperature any one country might be made to produce nearly all the plants of the earth. The paper contained several important facts, and the original may be found in the 5th Number of the Bibliotheque Universelle de Geneve. The President explained the discovery, by a French botanist, of cells or little membranous cylinders in the leaves of Kylanium, which are filled with little spiculæ, and gradually ejected. —A paper was afterwards read from Mr Thomas Hancock, on *Lamium maculatum* and *album*, and on the propriety of their being considered as distinct species. The author was led to investigate the subject, from having seen many specimens of the former species entirely destitute of the longitudinal white patches on the leaves, so particularly insisted on by most authors as its most important specific character; as well as from having witnessed several with *white* flowers (although Hooker and Lindley say that they are *constantly*

purple), and approaching so closely to L. album as to be scarcely distinguishable from it. The author considers that Reichenbach, in his figure and description of what he considered to be the true maculatum, and Dr Hooker, in his adoption of the same as such, had fallen into an error,—and that their plant was doubtless a variety of *L. purpureum.* Mr H. considers the number of the whorls not alone sufficient to found a specific character upon; and after detailing a *series of characters common to both* album and maculatum, and the *points of difference* between them, with other subjects having a connection therewith, concluded by stating, that these two plants should be considered only as varieties of one species, and he would propose the adoption of Dr Lindley's specific name *vulgatum.* The President then adjourned the Society to May 4.

Mr Hewett Watson's New Botanist's Guide, Vol. ii.—We are requested by Mr Hewett Watson to mention, that the whole impression of the second volume of the New Botanist's Guide has been destroyed by an accidental fire, when just ready for publication; and Mr Watson fears that other engagements will prevent him reprinting the volume for a considerable period. He is desirous of making known this accident, lest his friends, who have so largely contributed to the volume, should misunderstand the long delay which must now unavoidably occur in publishing their communications.

Ornithological Society.—A society with the annexed title is about to be established in London, and the following has been sent to us as the plan which the Provisional Committee of the St James's Ornithological Society recommend the members to adopt. "TITLE.—The Ornithological Society of London. MANAGEMENT. A Council with the usual Officers.—HONORARY MEMBERS. Limited to Five. Eminent Scientific Ornithologists, or Liberal Patrons of the Society. Elected by the Council.—ORDINARY MEMBERS. Elected by Ballot. Gentlemen will subscribe, annually, Two Guineas; Ladies, One Guinea. Entrance fee for Gentlemen, Two Guineas; for Ladies, One Guinea. Members of the St James's Ornithological Society will have the option of being Original Members of the Ornithological Society of London, at the annual Subscription of One Guinea.—FOREIGN MEMBERS. Elected by Ballot. Eminent Foreign Ornithologists.—FOREIGN CORRESPONDENTS. Elected by the Council. Residents abroad, desirous of assisting the Society; exempt from all pecuniary Contributions.—THE OBJECTS OF THE SOCIETY are to be attained by the exhibition of living Birds: the propagation and dispersion of the domesticate races: a Museum:

Library: Periodical Meetings: Ornithological Lectures: the Publication of Ornithological Works—Scientific and Practical: Prize Shews. LIVING SPECIMENS.—The Rasorial Genera, and their Types, will be particularly attended to, as being most beautiful and attractive, pre-eminently domestic and practically useful. The hardy birds will be gratuitously exhibited in the parks; those for which buildings are required will be seen by the public on payment of a small admission fee. THE DUPLICATES.—Birds and Eggs will be distributed among the Members. THE MUSEUM.—The specimens will be accurately named according to the Natural System; and so arranged as to convey to the student, through the eye alone, a general and accurate knowledge of the affinities and analogies of birds, and to exhibit examples of the different organizations which are known to accompany different habits and modes of life. The Museum will include stuffed Birds, Bird Skins, Skeletons, and parts of Birds, Nests and Eggs; and will be open, without restriction, to Scientific Persons and Artists. LIBRARY.—The Library will contain, ultimately, every Ornithological Work of merit; British and Foreign Ornithological Periodicals will be taken in, and circulated among such of the Members as subscribe an additional Half-guinea for this advantage.—PERIODICAL MEETINGS, or Converzationes, will be held for the exhibition of living and dead Specimens, Drawings, Books, Nests, &c.—for reading Ornithological Papers, and for oral observations. LECTURES.—Competent Ornithologists will be invited to deliver Lectures. PUBLICATIONS.—The Society will publish, or patronize the publication of, a general Ornithological Work at an accessible price: the proceedings will be published concisely and cheaply: and the Society will collect and publish all the information they can obtain as to the best modes of rearing Foreign Birds adapted for the Park, the Preserve, the Poultry Yard, and the Aviary. PRIZES.—A Prize of the value of L. 15 or L. 20 will be given annually for the best Paper on Systematic Ornithology, in elucidation of the power, wisdom, and goodness of God. Another of the value of L. 10 for the breeding of Foreign Birds: and a third of the value of L. 5 for the best method of keeping alive in this country such Foreign Birds as will not breed. Application will be made to Government for a Locality for the Society's Museum, Library, and Housed Collections: if the application be successful the Museum will be freely open to the Public three days a week. The ordinary Funds, arising from Subscriptions and Entrance Fees, will in the first instance be applied solely to the construction of Aviaries, and the purchase, rearing and breeding of Birds: and an extraordinary Fund will be raised by the creation of

100 Shares of L. 25 each, (to be paid, if desired, in two half-yearly instalments,) which will be applied exclusively to the purchase of Books, Specimens, and Cabinets, to lay a broad and solid foundation for a worthy Museum and Library. The Property thus acquired will be vested in the Shareholders; and will not, unless specially conveyed by donation, form part of the general property until the funds shall be sufficient to pay off the shareholders. The duplicates will, at first, be distributed among the shareholders only, and, in addition to the ordinary privileges of personal admission to Housed Collections, Museum, Library, and Meetings, they will be entitled to give a certain number of free admissions daily to Strangers.

Tamus communis.—This is, perhaps, one of the most common plants in Somersetshire. On the south west border, near the Bristol Channel, it lines almost every hedge for miles around. On comparing its characters with other diœcious plants, I have been surprised to find its near identity with *Dioscorea;* so much so, indeed, as to make it a point of discussion, whether it and *D. cajanensis* can, with propriety, be arranged in different genera, or even in distinct *species.* It is also very like *D. brasiliensis* and *D. sativa;* and, from the similarity in their fructification, foliation, and farinaceous root, it may well be termed the *European yam.* The root I have found to be very acrid, viscous, and replete with starch; and is with the berries, very largely and successfully employed by the country people in chilblains, rheumatism, and as a suppurative cataplasm.—*Thomas Hancock.*

Silene maritima.—I have discovered what I believe to be a new locality for this plant. In August last, while in Somersetshire, I found on the banks of the Bristol Channel, between the towns of Watchet and Minehead, an abundance of it in a state of flowering: in fact, the whole shore was almost overgrown with it. Although a *maritime* plant, it appeared to predominate in gravelly soils, and bearing no definite number of flowers on the panicles;—fully justifying Dr Hooker's observation, as to its intermediate gradations into S. inflata.—*Thomas Hancock.*

Pæonia officinalis.—This plant, regarded as having been introduced into England, has been found by my friend Mr Rootsey, in an excursion which I made with him last year near Bristol, growing apparently wild, in a thicket of bushes near that city.—*Thomas Hancock.*

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